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Republic of Montenegro



The **South Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons** (SEESAC) has a mandate from the United Nations Development Programme (UNDP) and the Stability Pact for South East Europe (SPSEE) to provide operational assistance, technical assistance and management information in support of the formulation and implementation of SALW co-ordination, control and reduction measures, projects and activities in order to support the Stability Pact Regional Implementation Plan, thereby contributing to enhanced regional stability and further long-term development in South Eastern Europe.

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***Regional Centre for Underwater Deming (RCUD) Technical Assessment, SEESAC, Belgrade
2003***

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Foreword

Although on the very wide borderlines of SEESAC responsibility, this technical assessment was funded in order to identify whether Under Water Explosive Ordnance Disposal (UWEOD) operations will result in any significant impact on wider weapons and ammunition destruction issues. The technical challenge of destroying explosive ordnance recovered from UWEOD operations, when combined with the Republic of Montenegro developing EOD capability required that the situation be examined.

It is apparent from this technical assessment that this is a demand for this specific area of EOD¹ in the region, yet it has a low profile, minimal funding and remains one of the greatest challenges for the embryonic Montenegrin EOD organisation. Much work remains to be done to ensure that a safe, effective and efficient response capability to deal with underwater explosive ordnance is developed in the region. Unfortunately there has been little, if any, donor or United Nations interest in this particular area of explosive ordnance disposal, and this report serves to highlight the risks, hazards and challenges in this highly specialist area.

It is also apparent that, when developed, there are excellent opportunities available at the Regional Centre for Underwater Demining (RCUD) for all weather, all season UWEOD training by other national assets. The level of threat is probably insufficient to justify further UN interest in this area on traditional humanitarian or developmental grounds, but the potential for the Republic of Montenegro to develop this training capacity under the NATO Partnership for Peace (PfP) concept is significant.

The Government of the Republic of Montenegro and the technical personnel at the RCUD are highly committed to this project and have a lot to offer. Therefore it is strongly recommended that the further development of this unique capability be explored with NATO PfP at the earliest opportunity.



Adrian Wilkinson
Team Leader SEESAC

Belgrade, 02 September 2003

¹ EOD includes Conventional Munition Disposal (CMD), Improvised Explosive Device Disposal (CMD), Radiological, Biological and Chemical Munition Disposal (RBCMD) and Underwater Explosive Ordnance Disposal (UWEOD).

Executive Summary

This technical assessment was commissioned by the South Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons (SEESAC). The technical consultant² visited; SEESAC Belgrade for initial briefing, the Regional Centre for Underwater Demining (RCUD) (Bijela), the local coastal environs, the Herzeg Novi Military Hospital and the UNDP Podgorica office during 03 - 10 July 2003.

The Director and small staff at RCUD were open and helpful, freely offering information, assistance and interpretation services. A previously programmed training course was to have been the vehicle within which to conduct the detailed assessment, however this had been cancelled. Unfortunately the Centre Director was called away for personal matters after the initial 24 hours of the visit. An initial impression was however possible with the following observations made.

- ❑ The RCUD as a Regional Operations Centre and training facility for underwater de-mining (Under Water Explosive Ordnance Disposal) (UWEOD) appears to be in an embryonic state.
- ❑ Office facilities, electronic data acquisition and processing, seminar and theory training rooms are established and developing, whilst practical training facilities, equipment and procedures appear to be in planning.
- ❑ Documented Health Safety and Environmental (HS&E) procedures, personnel and technical execution policies, standards and quality management systems need to be put in place.
- ❑ One underwater demining course had already been conducted but no training documentation was available.
- ❑ The purchase and support of the Bijela site and the conversion of the Centre office and theory training facility is a positive start; this also demonstrates a strong Governmental commitment. There is still much to do however.
- ❑ Routine modernisation of the accommodation areas and development of 'technical' and 'underwater training areas' and the provision of appropriate equipment for the task, will take significant resources. However much can be done within the present framework to progress policies, standards and procedures to establish a regional training facility
- ❑ The Centre currently appears to be a base for Montenegrin Police emergency response divers and is advertised to be a commercial sport diving school, catering for all Commercial and Sport (CMAS) levels though no facilities, equipment or personnel to support this particular role were in evidence during this short visit. According to RCUD publicity, August appears to be the busiest period.
- ❑ The site and local environs have considerable potential for the proposed UWEOD training facility, enjoying a sheltered location, varying depth and bottom type water conditions, easy access to an offshore practical explosive training area (polygon) and the entire regions' coastline. Also the Centre has potential to host NATO / PfP mobile underwater EOD formations and others as an alternative unit training site

² Stuart Harper, SAH Associates Limited (UK).

but that would probably be conditional on the availability of the live explosive training and demolition area.

- It is an aim to make RCUD self-sustaining in 3 years. Diversifying by establishing the Centre on a commercial diving basis (perhaps adhering to International Marine Contractors Association (IMCA) guidelines), offering progressively more technical sport diving courses and facilities. Offering facilities to NATO as part of Serbia and Montenegro's contribution to the NATO Partnership for Peace (PfP) programme could assist future income generation.

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Regional Centre for Underwater Demining (RCUD) Initial Technical Assessment

References:

- A. SEESAC SALW Collection and Destruction (Underwater) – Montenegro, Consultant –Terms of Reference, Dated 17 June 2003.
- B. UNDP Special Service Agreement No 2003-193.

1 Introduction

The author visited; SEESAC Belgrade for initial briefing, RCUD (Bieja) the local coastal environs, Herceg Novi Military Hospital (for recompression treatment chamber facilities) and UNDP Podgorica, under the terms of the References above in the period 3-10 July 2003. This report expands on the deliverables requirement at Reference A.

The Director and small staff at RCUD were open and helpful, freely offering information, assistance and interpretation services. A previously programmed training course was to have been the vehicle within which to conduct the detailed assessment however this had been cancelled. Also the Director was unfortunately called away for personal matters from midday on Sunday 06 July 2003 the first full day of the planned 3 day visit, until the author's departure, midday on 08 July 2003.

An initial impression was however possible with a number of observations being made. Follow up action is in hand to acquire the supporting information and translations of documentation necessary to complete all project deliverables. The time scale may require a short extension.

This project, though not specifically oriented toward small arms or light weapons (SALW) falls within SEESAC mission and goals of collection, destruction and technical assistance. It could also be a particularly good example of local coordination furthering cross border regional development.

In general terms, the underwater Unexploded Ordnance (UXO) and Explosive Ordnance (EO) declared as already detected in the region and discussed during the visit is assessed as unlikely to be 'collectible' within the SALW concept. Safety, logistic and operational considerations indicate that minimising movement, transport and storage can reduce risks. Therefore either using a basic blow-in-situ (BIS) technique or by moving or relocating items remotely underwater, when and where safe to do so, to approved underwater demolition grounds, probably represents the safest route where a comprehensive technical underwater EOD capability is not present.

At the request of the local UNDP office, a short verbal first impressions debrief was given to the Montenegrin Ministry of Internal Affairs officials and the US Consul prior to departure from Podgorica.

2 Scope issues

The Republic of Montenegro appears committed to conducting underwater ordnance clearance work in littoral and inland waterway areas in order to reduce the risk from all forms of EO. The other RCUD participating Nations' commitment has not been assessed but EO reported in rivers, canals, lakes, coastal approaches and inlets may well start to have some economic impact on redevelopment.

In the absence of any firm policy, it has been assumed that the RCUD, its permanent and temporary staff including any lecturers and instructors and all training and operational resources are and will continue to be, run on a civilian basis. Whilst some staff and students may have had previous and widely varied military exposure to land EOD or demining work in the region, few are likely to have specialist training or experience underwater.

One key issue is the demarcation between any underwater work which may in future be conducted by any of the regional military (Naval) forces and any work which may be considered by the 'civilian' participants of RCUD. This needs to be clearly defined and must also address the level of target ordnance complexity that it is intended civilian RCUD trained personnel will prosecute. This will drive training objectives and equipment complexity and cost. Also geographical areas must be identified which will for any reason, be outside the remit of RCUD. Certainly any operational work planned by RCUD and any practical training activity will need to be carefully co-ordinated with the regions' Naval and Military Authorities and Police services.

It not known if any structured and documented risk analyses have been undertaken on the known areas or items of underwater ordnance contamination detected so far. This essential operation should form the cornerstone of the Centre's early work, thereby assisting in the development of training processes. It is also understood that all underwater UXO/EO detection, prosecution and disposal work will be undertaken by personnel under civilian labour laws, which also may vary slightly in the participating Nations.

The exact position of the RCUD, sponsored by the Montenegrin Ministry of Internal Affairs with the MOD and Ministry of Foreign Affairs and the other regional National participants, needs to be formalised so that development priorities and plans for the Centre are all aligned. The organic underwater EOD capacity and capability which may evolve as the RCUD develops must have an agreed and prioritised task list to fit a business plan. This should probably be in place before approaches to potential Donors.

3 Initial observations - general

The RCUD as a Regional Centre and training facility for underwater de-mining (underwater EOD) appears to be in an embryonic state. Office, electronic data acquisition and processing, seminar facilities and theory training classrooms are established and developing. Practical training facilities, equipment and procedures appear to be in planning. Documented Health and Safety at Work (HSW), personnel and technical execution policies, standards and quality management need to be put in place. Site security needs to be established if the facility is to attract external users.

The purchase and support of the Biejla site and the conversion of the Centre office and theory training facility is a positive start and demonstrates a strong Governmental commitment. There is still much to do however. Routine upgrading of the accommodation area, development of 'technical' and 'underwater training areas' and provision of equipment for the task will take significant resources however much can be done within the present framework to progress policies, standards and procedures.

The RCUD is governed by a Board of Directors, chaired by Montenegrin Ministry of Internal Affairs who currently operationally fund the centre. It is managed on a daily basis by the energetic Director, Veselin Mijajlovic, who appears to be well connected throughout the region, has a positive vision for the Centre and yet is pragmatic about what may be realistically achievable.

The Centre is a member of SEEMACC, but it is not expected that much added value will flow from this link with respect to the practical conduct of underwater EOD work itself. In the formative period however, any information and intelligence on the area underwater threat and land access to that threat will be useful. SEEMACC will certainly assist in that that process.

The current role of the facility appears to be as training base for Montenegrin Police Emergency Response divers not deployed elsewhere in the country. It is possible that instructors and support staff for RCUD are drawn from these people.

The centre is also advertised to be a commercial sport diving school, catering for all levels though no facilities, equipment or personnel to support this particular role were in evidence during this short visit. According to publicity, August appears to be the busy period.

The site and local environs have considerable potential for the proposed UWEOD training facility, enjoying a sheltered location, varying depth and bottom type water conditions and easy access to an offshore practical live explosive training and demolition area (polygon) and the entire regions' coastline. Annex B shows the area.

4 Perceptions

It is understood that the Centre will act as the Adriatic Coast regional focus, co-ordinating all underwater UXO/EO data gathering, processing and dissemination work. It is also planned that the Centre will operationally direct and quality assure any reactive or planned EOD responses within whatever carefully defined technical capability may be agreed. It will achieve this goal using regional RCUD trained EOD divers in their own countries supplemented when necessary by RCUD staff and other graduates from the Centre. Local Montenegrin EOD clearance projects discussed are in various stages of planning but require funding.

The priority appears to be the proper establishment, development and conduct of theoretical and practical training for an estimated annual loading of about 40 students (approximately 3 courses of about 12 underwater demining personnel). Students will be drawn from the region with the possibility of others attending on an opportunity basis.

'Threat' information that was made available outside that sourced from SEEMACC, appeared to be general, non technical information and apparently reliant upon a network of sport diving instructors and other professional marine and waterway 'user' contacts of the Centre team. It became evident that these 'leads' were followed -up with RCUD reconnaissance dives only as funds became available.

Sport diving along the regions' coastline, inlets and lakes appears to be developing rapidly due to the climate, water clarity and the re-developing general tourist interest in the area. Growth figures were not available but it must be expected that the rapidly increasing popularity of sport diving and the ability of individuals to dive just about anywhere in the region for most of the year will certainly lead to increasing rates of UXO 'finds'. It is essential that a reliable and formal reporting system is put place in all participating Nations to capitalise on this activity growth. This can only help to support the position and aspirations of RCUD.

Underwater photography of items located so far indicates all types and ages of maritime, air, and land natures up to significant individual NEQ present in the region. There are also possible stockpile and operational dumping sites close to populated land. Database development and population will take time and a programme of search activity in the

areas likely to be of higher risk should be considered an early priority. Such UXO / EO survey should not involve intrusive work which in turn would allow more time to properly develop comprehensive clearance standards and training based on the actual threat detected.

5 The Biejla RCUD facility

The facility is located within an unsecured ex-hotel complex owned by the Montenegrin Government, adjacent to the waterfront in the northeast of Biejla town. The town has a medium size ship repair facility and tourist elements.

The facility on the site of the ex-Hotel 'Park' includes:

- ❑ A refurbished office and theory training / seminar building with capacity for a minimum of 5 permanent staff at present and about 12-15 trainees or up to 50 seminar delegates.
- ❑ A 50 room accommodation and catering facility with a bed capacity for about 100 persons with a small kitchen and restaurant area seating about - 50. A small campsite area is included.
- ❑ Storage and potential workshop space in garage type buildings with spacious and relatively secure vehicle parking and paved and grassed grounds with mature shade trees.
- ❑ A waterfront shallow jetty area with a small sea area across a narrow public access road, which offers local diving operations and mooring for the centre's 7 metre open RIB. An area of this seabed is earmarked for RCUD training.



It is apparent that the general public have free access through most of the domestic areas of the site, which includes the present equipment storage and workshop areas and grounds.

5.1 Office / Theory training area

The office and training building is a traditionally built stone domestic structure re-fitted and furnished adequately for purpose. A small computer network of a server, ¾ workstations with printing and scanning peripherals is present supplying administrative, training and website hosting facilities. A part time system administrator and an administrative assistant to the Director were present during the visit.

The main training and seminar room on the ground floor is fit for purpose with the Directors aim being to conduct all theory training with computer assistance wherever possible. It was stated that it is planned that graduates depart the course with training material in electronic format and maintain contact with RCUD through the web site with a secure 'members only' section.



Two or three dummy mine shapes, reported to have been provided by the Military were stored outside the building but no

other ordnance training aids or equipment were in evidence.

It was claimed that blow-in-situ (BIS) explosives and accessories that may be required will be provided from Military sources as and when requested. Representative training aids will be required. Methods of explosive storage, transport, security and payment were not discussed but must be addressed.

5.2 Local practical training area

An area of seabed approximately 30 metres seaward of the centre frontage is planned to be a non-destructive training ground, (polygon). This area is intended to provide a UXO recognition and handling circuit and a rigging, handling and underwater cutting training facility. Gas cutting techniques will be used to gain access to UXO and EO. Any EO that may be placed in this area must be certified free from explosive (FFE) by a competent authority, appropriately marked, registered and controlled. Stowage and use of cutting gases must be given due regard due to the proximity of the general public.

5.3 Coastal practical training area / offshore demolition area

A coastal live explosive underwater training and demolition area is situated offshore southeast of the inlet, about an hour away from the Centre by boat. It is operated by the Navy, with some Range Safety facilities already in place. Formal agreements must be made if this area is to be used by RCUD as Range Facilities are invariably expensive and need early co-ordination.

6 Standards (Deliverable 1.1)

6.1 Documentation

There is evidently a 'Charter' for the Centre, currently in translation, which will be forwarded when received.

It was not possible to view any specific RCUD underwater demining standards or diving / EOD training control documentation during the visit. The only 'manual' presented was a Serbian language commercially produced diving edition which appears to address mainly sport scuba diving activities. No HSW policy statements, plans or documentation were available, although the Medical Specialist confirmed use of US Navy decompression and treatment regimes and confirmed that a standard procedure covered emergency and therapeutic recompression in the region.

Although one 'underwater demining course' had been completed there was no detailed training or quality control documentation available for scrutiny during this visit. The outline-training programme of the cancelled course is at Appendix 1.

Also no graduate from the course was available or any of the specialist instructors. It is understood that the course lecturers and additional instructors have and will in future, be brought in from regional academia, military and commercial sources as required. According to the Director these people have delivered training in accordance with the general objectives and syllabus but to what standard and in how much technical and operational detail is not known. What change processes will be applied is also uncertain.

The RCUD web site claims that completion of successful training offers a 'certificate acknowledged in the world' but documentary evidence of who accredits the training and what comprises the quality management system was not sighted.

There were no specific defined standards for RCUW operational diving apart from adherence to CMAS (Confederation Mondiale des Activités Subaquatiques (World Underwater Federation)) / CEDIP (European Committee of Professional Diving Instructors) sport diving qualifications system shown at Appendix 2.

The RCUW management IT and GIS system is under development. No security, control or operating policies were seen. GIS is presently based on proprietary satellite imagery, which is believed to have been supplied by one of the Donors. Whilst the topography, general weather patterns and clarity of water in the region allows for easy visual references, precise navigation is fundamental for efficient underwater UXO / EO marking, relocation and reporting, especially defining the extents of contaminated areas offshore. No navigational equipment or standards were sighted.

6.2 General equipment



Only basic Scuba air diving equipment was viewed and this appeared to be almost new, which is understood to have been donated by the USA. Diving air compressors are nearly new and though not viewed on this occasion, a planned maintenance system (PMS) is claimed to be under development to cover critical life support equipment and high-pressure (HP) air systems.

A portable therapeutic oxygen delivery system is available (normal diving practice).

The small, new computer network is under development to assist with the management of the centre and provide databases, web site facilities, a training system and GIS facilities. This had apparently been donated from EU sources.



No technical UXO detection, identification or basic underwater EOD equipment was seen apart from a Fisher Hand Held detector.

6.3 Comparison with best practice

RCUW appears to fall between the two usual positions for entities carrying out this type of work. Best practice would be that executed by major NATO Navies who have extensive resources. Acceptable practice may be conducted by commercial organisations that are appropriately trained, equipped and experienced, but even then they may well encounter ordnance beyond their capability.

RCUW is not a military organisation, and neither does it appear to be based on a commercial EOD diving concept. This is usually a contractual situation where the client requires adherence to certain diving execution and equipment standards or guidelines such as those of the International Marine Contractors Association (IMCA) and the contractors own underwater EOD standards as agreed.

Within a nation's littoral boundary, National Diving Rules have precedence over all other guidelines. Commercially, health, safety and environment considerations often require extensive additional aspects to be added on to national rules. These may be developed for specific tasks but are usually agreed in advance and fully documented with extensive risk assessments. Sport diving 'standards' offer a framework, but may not cover all of the detail required for high-risk work underwater.

Commercial EOD standards and what is 'best practice' underwater depends on who conducts the work, their individual and team training and experience. This is usually a

combination of national (Naval) standards augmented by sound risk management and explosive engineering principles. Montenegrin / regional standards were not available and it is not known if such local naval standards can be adopted. The level of personal exposure, the urgency of the task, implications if there is an explosive incident or accident, the type and complexity of equipment used and the support systems available, must all be considered in relation to the threats encountered

If personnel attending courses and conducting clearance work under the auspices of RCUD are only ever regional police or other government departments' people, they should operate under an agreed legislative code, an example of which is the UK Diving Operations at Work Act. Such acts are necessarily prescriptive and take considerable time to develop but are designed to protect both the workforce and the 'employers'. Certain additional caveats will also be required for underwater EOD work to further reduce risks where possible – such as minimising personnel exposure to potential blast effects by modifying diving rules and continuously training to these rules.

It is understood that the aim of RCUD training and operations is to be able to safely deal with any ordnance found underwater in the region. It is possible that some items that may be in the region could present a threat beyond the personnel and equipment capability that is planned not only for EOD work but also EOR. Certain weapon sensors may react to influences present in basic SCUBA equipment and may also require specialised work techniques during underwater approaches to and any work on, or adjacent to them such as placing countermining charges.

Personnel at risk should be fully aware of all their equipment, training and experience limitations. Remotely operated systems can be used but are expensive.

RCUD policies are developing. Standards, procedures and training are all in an embryonic state. No underwater EOD or EOR equipment was seen or proposed equipment requirements discussed.

The RCUD may well need assistance to further this work to present a basic solution proposal to prospective donors.

7 Underwater EOD / EOR observations and recommendations

The visit was undertaken with an open mind. It quickly became evident that RCUD is embarking on an ambitious project given the non-military nature of the Centre and current limited potential funding arrangements.

Nations navies spend vast amounts of money developing, training and maintaining a current, credible and effective response to UXO / EO underwater. Even then it is a particularly high- risk task. If all that is required is a basic search, EOR, BIS capability with limited movement of large EO in the water to demolition areas then that should be feasible. It is apparent that they do have aspirations to conduct much more complex underwater EOD tasks.

It was expected that RCUD would perhaps have had some self-imposed limitations as to what natures of UXO /EO they were intending to deal with given the history of the region and the non-military status of the centre.

It was also expected that there would have been some type of formal service level agreement made or under negotiation whereby underwater tasks outside the technical capability and capacity of RCUD or RCUD trained people in any Nation in the region, could be passed to the respective Ministry of Defence for resolution.

For example, the industrial processes required to safely clear, (and dispose of where required), an underwater dumping ground (official or not) of ex-stockpile natures is a very different task to expediently clearing a modern influence fused item in a busy navigable waterway. Priorities, equipment and methodology will be vastly different as will be the risks individuals and teams are exposed to and the possibilities of liability and expensive collateral damage should it not go entirely according to plan.

Whilst it is evident that the Director and others have a military explosives and ordnance background and varying degrees of diving qualification and experience I do not believe there is complete comprehension of the overall scale of the task. Also there may be a lack of understanding of the long-term resource requirements that will be required to maintain capability initially achieved. Financial capital, personnel and running costs to provide a full underwater EOD response in the region to meet and safely deal with the possible range of ordnance that may be encountered over a medium term (5-10 years) will not be cheap.

To attract further Donor interest and support it is necessary that the RCUD formulates a detailed technical projection.

8 Diving observations and recommendations

8.1 Equipment

The only equipment viewed at RCUD was eight sets of basic air scuba diving equipment and two HP air compressors used to fill divers' cylinders.

There appeared to be a personal issue system of wet suits and buoyancy control devices.

Equipment was housed in a garage building to the rear of the accommodation. No lockers, benches, test tanks or other facilities to store, prepare and maintain equipment were sighted. Suits and first and second stage regulators were hanging on an extempore drying rail.



A small outboard powered rigid inflatable boat was available for diving support, moored adjacent to the accommodation. The boat and motor appeared to be relatively new and outfitted with a sun canopy, basic navigation lights and a marine VHF radio. Maintenance documentation was not sighted. A road trailer may be available.

It was claimed that two Aga Divator positive pressure full face masks with through water communications, an underwater video and a still camera equipment was held personally for security reasons, by the Director. These were not sighted.

It is not known if that equipment that was seen constitutes RCUD training and operational assets or if it is shared with the Police emergency diving response team who appeared to be the only divers on site using the kit.

The equipment was modern, proprietary sport diving kit and looked to be fairly new and in good external condition though a documented planned maintenance system, especially for life support items, was not present. It is not known if the RCUD maintainer who was not present during the visit, is a trained and 'competent person' to conduct this work.

HP air cylinders were stamped and in date and appeared free of scratches and gouges. Two 380-volt HP air compressors appeared to be in good condition. Filters and separators were stated to have been maintained in accordance with the manufacturer's specifications but this was not documented and could not be verified.

Divers appear to rely on sport decompression computers. Calibration issues and fail-safe data logging to permit supervisory control has not been addressed.

No other support or ancillary equipment that would typically be used for underwater UXO / EO detection and EOD work was evident such as; precise navigation equipment, buoys, sinkers and cordage to mark areas, conduct detailed searches and mark finds. Also there was no evidence of safe work systems used to reduce risk to divers such as remotely operated underwater lifting bags, mini ROV's (Remotely Operated Vehicles with cameras only) or other remote detection systems.

8.2 Diving support, procedures, standards and facilities

No RCUD written risk analyses, operational procedures (OP's), emergency procedures (EP's), work methods, safety criteria, task load lists (permanent and consumable stores) or accident and incident reporting systems were evident.

It should be noted that any underwater EOD operation or training should be conducted strictly as a team evolution with all members aware of all risks, plans for the conduct of work and contingencies in case of emergency or incident.

Diving at the RCUD appears at present to be based on a Serbian Language predominantly sport diving oriented manual. It is not known if there is a requirement to have this manual available at each dive site. One short local dive observed indicated that procedures and methods are based on sport diving tenets rather than Military or Commercial systems.

It was stated that all decompression and therapeutic regimes used were in accordance with US Navy Diving Manual.

The area Shore treatment facility at the Military Hospital, approximately 12 km south west of RCUD, is a modern, two independent chamber Draeger design in a purpose built vehicle accessible building. Predominantly used for hyperbaric oxygen medical treatments, it has lock-on transfer-under-pressure (TUP). Facilities for transport or smaller chambers, abundant stored gas and a gas mixing station. It was not assessed if this system can accommodate local mobile operational chambers.

This facility is run by a Hyperbaric Medicine Specialist who also is a nominated lecturer to the proposed RCUD course. This Doctor is also understood to conduct screening, diving medicals and treatments on RCUD and other personnel at the Centre.

It was claimed that the Navy provided a vessel with a single compartment, one-man chamber for deep diving for RCUD when required though neither was seen and the actual depth limit of when 'deep diving' started – i.e. when a chamber is required at the dive site - was never stated. Details of the Galeattzi chamber system were not provided but it may be an older design without built in breathing systems to administer oxygen or transfer under pressure facilities.

Also no details were available of chamber /patient transport arrangements including helicopter facilities. The local terrain does not easily lend itself to low altitude helicopter transit.

8.3 Diving personnel –training and background

Diving appears to be conducted under the CMAS umbrella. CMAS is generally an international association of sport diving instructors and sport industry related leaders. CMAS has a range of standards and guidelines but they tend to be general in nature relying on individual divers' adherence to 'good practice'.

Master diving records, project logs and divers individual logs and qualification documentation were not sighted neither were current medical clearances to dive. An assessment of the experience levels of personnel was not possible. No commercial diving legislation, documentation or standards was evident.

The diving personnel at the RCUD during the short visit appeared to be physically fit, mature and motivated. It is understood the majority were Montenegrin Police emergency response divers who are required to conduct rescue, search and other tasks year round in all conditions in sea and fast water.

It is not known if any of the RCUD permanent or temporary staff, visiting lecturers or potential students have or are likely to have IMAS or equivalent EOD qualifications gained either through previous military service or external courses.

It is likely that potential donors would wish to know the diving and EOD qualifications and skill levels of the instructional staff as a minimum.

9 Training (Deliverable 1.3)

9.1 Introduction

The aim is to run 18-day duration courses of 8 to 12 people with a similar number of instructional and support staff. Based at the RCUD moving to local and distant training areas on a daily basis, classroom theory will be supported by dry and wet demonstration and practical student exercise. A final exam, written and oral, concludes training. Pass / Fail criteria and re-attendance requirements were not discussed.

The current RCUD plan caters for a single tier training system based upon students attending possessing a basic level sport diving qualification. There appears to be no pre-course aptitude or competency testing or educational standard vetting. A diving medical is required and a practical diving entry test is programmed on day 1.

Given the RCUD operational concept planned for the region and this authors understanding of the local threat, it is assessed that very inexperienced people graduating could rapidly encounter UXO / EO underwater well beyond their individual skill and competence levels. This could have potentially serious consequences.

Adopting a commercial or military diving tiered type training system would ensure experience is gained progressively and decision-making is vested at the correct level.

The planned course progresses rapidly six days a week in a mix of theory and practical lessons with no margin for weather, reinforcing activities, injury or illness. Materiel and instructor preparation will need to be particularly thorough and students resilient to keep to the programme.

The course objectives and outline lesson plans viewed in the schedule addresses most of the major topics required. Without translated detailed training documentation and performance criteria it is difficult to assess exactly the individual topics. The framework

discussed should offer a basic level underwater operator who can work within a team environment with close supervision.

9.2 Standards

The CMAS diving standards and personal qualifications (Appendix 1) are derived primarily for the sport diving industry. Adopting commercial standards and guidelines such as IMCA will cost more in equipment and manning but may offer a ready-made benchmark which potential Donors could see as advantageous. This could have the added benefit of extending opportunities for the future commercial development and self-sustaining aim of RCUD.

One major benefit of the commercial route is that equipment and support facilities can be leased for training or operational periods and this may better fit funding profiles. Similarly, detailed National commercial diving legislation designed to protect employees and employers takes years to develop. Legislation such as the UK Diving Operations at Work could provide a framework upon which local rules could develop.

The only available EOD Standard that can be applied is IMAS 09.30 and it is not clear if the centre will attempt to seek accreditation as a Level 3 training school. The additional curriculum items for underwater explosive engineering, cutting and welding and construction should all be covered by National or perhaps in this specialised case, regional HS&E legislation.

9.3 Comments

The course appears to be reasonably well structured but depends on students already being competent divers.

The course appears quite intensive. Whether enough time is allowed for each individual to achieve a satisfactory level of practical training task exposure in each topic is debatable. Without sight of the full training documentation it is difficult to gauge the likely outcomes.

Quality management of the training regime should be an early objective.

It is apparent that the Centre's instructors are sport diving qualified. It could not be ascertained if any held commercial or military qualifications. This type of EOD work relies on diving merely being a transport system for the EOD operator. It may be worth some instructors achieving full commercial supervisor and instructor status.

10 Suitability of the RCUD for other organisations (Deliverable 1.8)

The location, environment, domestic facilities and year round operability in the area could offer welcome opportunities for hard pressed NATO, PfP and other mobile underwater EOD formations to train away from their bases in a Mediterranean climate.

The underwater topography indicates that all forms of EOD diving could be achieved within 10 nautical miles of the Centre all but the most extreme weather conditions.

The availability of vessels that could embark and daily support dive teams and their equipment, including operational chamber systems, would be a critical path. NATO and PfP formations are unlikely to train without their organic chambers and equipment present.

Security, storage and workshop space at RCUD would be a major consideration for potential visitors.

Control of local sea areas during potential training exercises would be a governing factor and any attendance may be conditional on availability of the live range /explosive training facility.

The domestic arrangements, hotel, feeding and campsite, if kept at attractive prices offer adequate facilities for visitors. Some routine upgrading will be required to rooms.

Air, sea and land routes into the area are all advantageous and Montenegro should consider attractive inducements to potential visitors.

11 Conclusions

Exactly which Ministry has responsibility for UXO / EO underwater in each of the RCUD participating regional Nations is not yet clear.

What the exact roles, tasks and geographic areas of responsibility of Naval, Military or other governmental forces or organisations of the regions with respect to UXO /EO underwater is not defined.

The RCUD terms of reference, technical limitations of its staff and graduates operationally and during training, scope and exact area of responsibility is not fully defined. It is also unclear as to what the RCUD considers its basis; a Montenegrin Government department or a civil contractor? This affects exactly how underwater UXO / EO is dealt with, employment terms and conditions for employees, insurance and perhaps most importantly, equipment and manning levels.

The Centre is not yet formally established as

- ❑ A regional coordination centre of underwater UXO / EO contamination information. (Acquisition, processing, dissemination and development of useful databases. Risk analyses)
- ❑ A regional centre of technical ordnance information on the natures that have so far and are in future likely to be detected underwater. (Little technical EO information is held)
- ❑ A regional centre of technical information that will provide safe and effective standards and procedures for the reduction of risk from UXO / EO underwater in the area. (Standards, operational procedures, HS&E).

The Centre is not yet ready to conduct safe and effective basic level EOR/EOD training in accordance with international best practice and norms as:

- ❑ Full training documentation and controls were not seen.
- ❑ Training aids, simulators, lesson plans and resource requirements need to be defined.
- ❑ Equipment to train students in the course size predicted is not present..
- ❑ No full time core of qualified and experienced lead instructors is available to develop theory and practical lessons to a safe and efficient system.

12 Recommendations

The concept is sound, the intentions laudable and the local commitment excellent, but funding, personnel and external support is required to develop the framework to safely achieve basic aims and support should be formally sought from potential Donors.

Donors should be encouraged to develop the concept to operational capability.

The RCUD should adopt and implement internationally recognised terms and definitions when dealing with the international community. This will assist potential donors in evaluating proposals. For example, the name of the centre suggests that it is designed purely to remove anti-personnel and anti-tank mines laid underwater (demining³), whereas in reality it has aspirations to deal with all explosive ordnance and should therefore be an Regional Centre for UWEOD⁴ (RCUWEOD). It should also be noted that the UN Mine Action Service (UNMAS), the lead coordination body for the humanitarian clearance of contaminated areas does not have any responsibility for UWEOD; therefore assistance is more likely to be obtained from other international organisations or national navies.

³ Demining is defined by the International Mine Action Standards (IMAS) 04.10 - Glossary as: ***activities which lead to the removal of mine and UXO hazards, including technical survey, mapping, clearance, marking, post-clearance documentation, community mine action liaison and the handover of cleared land.***

⁴ EOD is defined by IMAS 04.10 as: ***the detection, identification, evaluation, render safe, recovery and disposal of UXO and explosive ordnance.***

Annex A (Informative) Terms and Definitions

A.1.1

BIS

blow-in-situ

A.1.2

booby trap

an explosive or non-explosive device, deliberately hidden with the intent of causing casualties when an apparently harmless object is disturbed or a normally safe act is performed⁵.

A.1.3

CEDIP

European Committee of Professional Diving Instructors

A.1.4

CMAS

Confederation Mondiale des Activities Subaquatiques, (World Underwater Federation).

A.1.5

detonation

the rapid conversion of explosives into gaseous products by means of a shock wave passing through the explosive⁶.

A.1.6

detonator

a device containing a sensitive explosive which produces a detonation wave, which is normally used to initiate other, less sensitive, explosives⁷.

A.1.7

explosive ordnance

all munitions containing **explosives**, nuclear fission or fusion materials and biological and chemical agents. This includes bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket and small arms **ammunition**; all **mines**, torpedoes and depth charges; pyrotechnics; clusters and dispensers; cartridge and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive devices; and all similar or related items or components explosive in nature. [AAP-6]

A.1.8

Explosive Ordnance Disposal (EOD)

the detection, identification, evaluation, render safe, recovery and final disposal of unexploded explosive ordnance. It may also include the rendering-safe and/or disposal of such explosive ordnance, which have become hazardous by damage or deterioration,

⁵ NATO Allied Administrative Publications (AAP) No.6 – 2003.

⁶ www.undp.org.yu/seesac Draft RMDS 02.10 - SALW Standards/ SALW definitions.

⁷ NATO Allied Administrative Publications (AAP) No.6 – 2003.

when the disposal of such explosive ordnance is beyond the capabilities of those personnel normally assigned the responsibility for routine disposal.⁸

Note: The presence of ammunition and explosives during micro-disarmament operations will inevitably require some degree of EOD response. The level of this response will be dictated by the condition of the ammunition, its level of deterioration and the way that it is handled by the local community.

A.1.9

EOR

(explosive ordnance reconnaissance)

A.1.10

EP

(emergency procedure)

A.1.11

FFE

(free from explosive)

A.1.12

GIS

geographical information system

A.1.13

H&SE

(health, safety and environmental)

A.1.14

HP

(high pressure)

A.1.15

HSW

(health and safety at work)

A.1.16

IED

(improvised explosive device)

those devices placed or fabricated in an improvised manner incorporating potentially destructive, damaging or lethal chemicals, designed to destroy, disfigure or harass. They may incorporate military stores, but are normally designed from non-military components.⁹

A.1.17

IMAS

(International Mine Action Standards)

A.1.18

IMCA

(International Maritime Contractors Association)

⁸ UN Guidelines for Stockpile Destruction, June 2000.

⁹ *Ibid.*

A.1.19

IT

Information Technology

A.1.20

MFA

(Ministry of Foreign Affairs)

A.1.21

MOD

(Ministry of Defence)

A.1.22

NATO

(North Atlantic Treaty Organisation)

A.1.23

NEQ

(net explosive quantity)

A.1.24

OP

(operational procedure)

A.1.25

PfP

(Partnership for Peace (NATO))

A.1.26

PMS

(planned maintenance system)

A.1.27

RCUD

(Regional Centre for Underwater Demining)

A.1.28

ROV

(remotely operated vehicle)

A.1.29

RSP

(render safe procedure)

the application of special explosive ordnance disposal methods and tools to provide for the interruption of functions or separation of essential components to prevent an unacceptable detonation.¹⁰

A.1.30

SALW

(small arms and light weapons)

¹⁰ NATO Definition.

all lethal conventional munitions that can be carried by an individual combatant or a light vehicle, that also do not require a substantial logistic and maintenance capability.¹¹

A.1.31

SCUBA

(self-contained underwater breathing apparatus)

A.1.32

SEEMACC

(South Eastern Europe Mine Action Coordination Committee)

A.1.33

SEESAC

(South Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons)

A.1.34

SPSEE

(Stability Pact for South East Europe)

A.1.35

UNDP

(United Nations Development Programme)

A.1.36

UNMAS

(United Nations Mine Action Service)

A.1.37

US(A)

(United States (of America))

A.1.38

UWEOD

(Underwater Explosive Ordnance Disposal)

A.1.39

UXO

(unexploded ordnance)

any explosive ordnance which has been primed, fuzed, armed or otherwise prepared for action and which has been fired, dropped, launched, projected or placed in such a manner as to constitute a hazard to operations, installations, personnel or material and remains unexploded either by malfunction or design or any other cause.¹²

A.1.40

VHF

(very high frequency)

¹¹ www.undp.org.yu/seesac Draft RMDS 02.10 - SALW Standards/ SALW definitions.

¹² *Ibid.*

Annex B
(Informative)
Curriculum Vitae - Technical Consultant

STUART A HARPER

December 2001 - Present

Director - Consultancy Company – SAH Associates Ltd.

Providing offshore and near shore EOD and diving consultancy services to international oil companies in; the development of concepts, standards and strategies, tender preparation and bid processing, contract execution including practical oversight of tasks, all within defined Quality Management systems taking IMAS concepts offshore.

Presently in Sakhalin Island, Russia on SEII Project.

November 1999 – December 2001

Market research and business development. Maintenance of CPD.

Personal matters following 32 years Royal Navy service. Travelling and sailing.

June 1999 - October 1999

Attached to Superintendent Of Diving RN for strategic staff work. Commission ended 28 Oct.

May 1996 – June 1999

Commanding Officer, Defence EOD School (Army Training and Recruiting Agency). UK and NATO EOD policy and concepts including PFP development, UK and NATO training policy development and execution, equipment development, trials and introduction into service. Budget Holder. Policy and development of UK underwater EOD capability to meet worldwide threats.

April 1991 - May 1996

Commanding Officer Fleet Diving Group and Deputy Superintendent of Diving RN. (Commander-in-Chief Fleet) UK and NATO underwater EOD and UK and NATO tri-Service diving concepts, policy development, equipment, operator training and the maintenance and development of capability to meet UK and worldwide threats. Conduct of Operations and operational training worldwide. Included all NATO diving, EOD and submarine rescue forums and planning and provision of all reactive diving and EOD capability and services to CinC FLEET operations and exercises worldwide.

April 1989 – April 1991

Commanding Officer HM Ships COTTESMORE and BERKELEY.

Operations and operational training.

April 1986 – April 1989 (Included Advanced Minewarfare Course)

Staff Minewarfare and Clearance Diving Officer Flag Officer Plymouth.

CO Plymouth Diving Unit (Post Now CO Southern Diving Group). Duties included;

planning and execution of all minewarfare, clearance diving, and support diving operations and operational training in the UK and NATO sub-area. Included representation at NATO minewarfare, diving and EOD forums and exercise planning.

January 1983 – April 1986 (Period included RN Staff College, Greenwich)

Operations Officer and Senior Specialist HMS CHALLENGER.

Seabed Operations Vessel. From build and Commissioning through acquisition of manned and unmanned seabed intervention capability for UK Defence Policy.

Included development of bespoke specialized training packages, equipment trials and development of operational and training procedures.

September 1980 – December 1982

Operations, Test and Evaluation Officer, US Navy Experimental Diving Unit. (Exchange Post). Practical development and testing of all underwater systems, equipment, training, maintenance and further field evaluation of diving and EOD systems for USN Defence Policy.

May 1980 – September 1980

Attached to Superintendent Of Diving RN. Capability planning.

May 1978 – May 1980 (PWO Course and ISC Apr 77 to May 78)

Principal Warfare Officer HMS DIDO. Responsible for fighting the ship, conduct of all underwater sensors and weapons, maintenance of operational capability and readiness including; exercise planning and execution and training.

April 1973 – April 1977

Long Minewarfare and Clearance Diving Officers Course and Executive Officer HMS KIRKLISTON. Period included 14 months as lead ship STANAVFORCHAN.

Stuart Anderson Harper (DoB 28/10/49)

Has held several RN small ship and Shore Commands, maintained currency and remained in date medically to dive until retirement in all RN (and some USN) diving equipments and techniques, without a break for nearly 32 years. This includes all EOD and for short periods IEDD and underwater engineering. He has been closely allied to all UK and NATO diving and EOD policy, practice, programmes and training for the past 25 years. For the past 18 months he has been actively involved in translating acquired skills into the civilian arena.

He holds membership of the Institute of Explosive Engineers and Institute of Munition Clearance Engineers, has a clean driving licence and holds current UK offshore medical and survival certification and a Maritime VHF licence.

Appendix 1A (Informative)

Our number:051/03 – 02/01



REGIONAL CENTER FOR DIVERS TRAINING IN

UNDERWATER DEMINING - BIJELA

CRNA GORA

tel: +381/81-247-107; fax: +381/81-247-107

E-mail: rcud@cq.yu

PROJECT - TRAINING OF DIVERS IN HUMANITARIAN DEMINING

Bijela, May 12, 2003.

Regional Center for Divers' Training in Underwater Demining is founded by joint initiative of the Government of the Republic of Montenegro, International Trust Fund for Mine Action and Mine Victim Assistance from Ljubljana - Slovenia and other South - East Europe countries. Its basic task is to co-ordinate regional activities concerning humanitarian underwater demining in the coastal area of the Adriatic sea and in the rivers and lakes of the South - East Europe, conduct divers' training and carry out other activities with the aim to strengthen capacities in this part of Europe for independent performance of the most complex operations in the underwater demining field.

The Center activities are part of the regional projects for post conflict recovery with the aim to create a region without mines, to enable free movement of people, to develop different forms of the regional cooperation and to strengthen measures of mutual confidence and understanding. In this context, the Center has a prominent humanitarian, regional and co-ordination character.

Although in this moment the activities of the Center depend mainly on international donations, the projects made, among other things, have a developmental character with purpose of reaching full organizational and complete economic preservation and functioning three years after its foundation. In the forthcoming period, the Center will carry out activities with purpose to develop its regional capacity and at the same time realize its economic independence.

REGIONAL CENTER FOR UNDERWATER DEMINING

OBJECTIVES

The tasks of the Center are to:

- ❑ train South - East Europe region divers for underwater demining and for protection measures against UXOs in water;
- ❑ conduct underwater exploration projects as well as projects of civilian protection against unexploded devices.
- ❑ remove the underwater unexploded devices in this Region.
- ❑ participate in operative investigations and mapping of underwater minefields in the Region.
- ❑ induce and co-ordinate all interested institutions and individuals in the South-East Europe region with purpose of co-ordinating their engagement in the improvement of human resources through the training in the humanitarian underwater demining.

Please, visit our Internet presentation for additional information on the site :
www.rcud.cg.yu



PROJECT - DIVERS TRAINING IN HUMANITARIAN DEMINING

Plan of performance:

Performers: Time of perform.

0	Divers training project	Project duration 17 days	Project performer RCUD	Start of project	End of project
1	1. Start of project	0 d		08.06/03	
2	2. End of project	0 d			30.06/03
3	3. PROJECT PREPARATION PHASE	2 d	Teaching staff – divers for preparation of underwater polygon – vessels –diver equipment	08.06/03	
4	3.1 Preparation for exploration and data processing	1 d			
5	3.2 Underwater Preparation	1 d			
8	3.3 End of preparation phase				10.06/03
9	4. TRAINING PHASE	17 d	Teaching staff-instructors + equipment + means	11.06/03	
10	4.1 Organization of the logistic support	0 d			
11	4.2 Training	17 d			
12	4.3 End of training	0 d			28.06/03
12	5. END OF TRAINING PHASE	5 d	4 divers + equipm. + logistics	29.06/03	
13	5.1 Exams	1 d			
14	5.2 Final exams compilation of documentation	0 d			
17	5.5 End of project	0 d			30.06/03

PROJECT - DIVERS TRAINING IN HUMANITARIAN DEMINING

TRAINING TOTAL PRICE : 44.016 €

TRAINING PRICE

Plan of project performance	no. of project participants	days of training in total	hours of train. in total	price of train. per hour	total price
1. TRAINING PREPARATION PHASE	12 divers + 11 teachers and instructors + 4 logistics off. + 2 physicians	2 days	16 hours	30 €	480 €
2. TRAINING PHASE	12 divers+ 11 teachers and instructors + 4 logistics off. + 2 physicians	18 days	148 hours	50 €	7.400 €
3. FINAL TRAINING PHASE	5 members of commission + 12 divers	1 day	10 hours	30 €	300 €

TOTAL PRICE OF DIVING WORKS :

8.180 €

PRICE OF LOGISTIC SUPPORT

PROFESSION	NO. OF PARTICIPANTS	NO. OF DAYS	PRICE PER DAY	TOTAL PRICE
Compressor tech. for tanks filling + 3 logistic off.	4	22 days	50 €	1.100 €
Boat and crew	3	12 days	300 €	3.600 €
Physician and medical tech. with ambulance	2	22 days	100 €	2.200 €
Expert for technical documentation compilation	1	2 days	100 €	200 €

TOTAL PRICE OF THE LOGISTIC SUPPORT :

5.000 €

PRICE OF EXPLOSIVE , IGNITION MEANS AND OTHER MATERIAL

TYPE OF MEANS FOR TRAINING	QUANTITY	PRICE
Plastic explosive, ignition means– electric fuse and others with their transportation and storing	70 kg.of the plastic explosive and ignition means	5.000 €
construction of elements for underwater destruction – wooden beams, reinforced concrete poles, tracks and metal elements with their loading, transportation and discharge	cca. 5 tones	4.000 €

TOTAL PRICE OF EXPLOSIVE, IGNITION MEANS AND OTHER MATERIALS:
9.000 €

ACCOMMODATION PRICE AND TRAVEL COSTS OF PROJECT PERFORMERS

PROJECT PERFORMERS	NO. OF PERFORMERS	NO. OF DAYS	PRICE ACCOMM. AND FOOD PER DAY (THREE MEALS)	TOTAL PRICE
teachers and instructors	10	20	28 €	5.600 €
divers- students	12	20	28 €	6.720 €
logistic officers	4	22	28 €	2.464 €
physicians	2	22	28 €	1.232 €
TRAVEL COSTS	NO. OF PERFORMERS			AMOUNT OF TRAVEL COST DEPENDING ON DESTINATION
teachers and instructors	10			2.500 €
divers - students	12			3.000 €
physicians	2			500 €

TOTAL PRICE OF ACCOMMODATION, FOOD AND TRAVEL COSTS: 22.016 €

OBJECTIVES:

Through the training we want to achieve to:

- ❑ develop expertise in relation to types of explosive substances and pyrotechnical mixtures found underwater and their effects.
- ❑ train participants to handle with explosive devices in water,
- ❑ train participants to work with various types and models of fuses and detonation mechanisms - devices function underwater,
- ❑ train participants to use various methods and means for finding UXO underwater
- ❑ train participants to destroy elements underwater,
- ❑ introduce participants to organization and carrying out intervention and rescue underwater,
- ❑ train participants to communicate using various techniques underwater,
- ❑ train participants how to use First Aid,
- ❑ train participants to handle ignition means and equipment underwater,
- ❑ train participants to take necessary individual security measures when handling UXO underwater, that is, develop the awareness of the need for self-protection and security measures in handling with UXO,
- ❑ train participants to transport UXO,
- ❑ train each participant to develop capacity to make decisions how to discover, recognize, transport, deactivate and destroy UXOs,
- ❑ review knowledge and skills in examining water area (includes also banks, shores and swamps) and extend knowledge for use of electronic means to detect UXO,
- ❑ review knowledge and skills of diving in stream, underwater jobs and lifting, diving in closed environment, depth diving and diving in winter conditions,
- ❑ train participants to take protection measures against UXO in still and running water,
- ❑ train participants to carry out, that is, arrange lifting of UXO in various conditions

CONDITIONS:

- ❑ To finish the qualification of divers according to the training program for underwater humanitarian demining in the foreseen period of time.
- ❑ To perform divers training with the assistance of skilled teaching staff in underwater deminers training.

VOLUME OF PROJECT:

- ❑ The project consists in training of 12 divers from the countries of the Region
- ❑ The training program will be comprised of 148 lessons, which will be divided into 63 classroom instruction lessons and 85 hours of practical exercises.

ENCLOSURE:

- ❑ COURSE PROGRAM

Director of Regional Center
for Underwater Demining
Veselin Mijajlović

Appendix 1B (Informative)



CLASSES SCHEDULE FOR COURSE FOR PROTECTION OF UXO IN WATER
AND PERFORMANCE OF THE COURSE IN REGIONAL CENTRE FOR
UNDERWATER DEMINING – BIJELA JUNE, 2003.

SUN	RECEPTION AND ACCOMODATION OF ATTENDEES		
MONDAY	<p><u>08:00 – 09:30 EC-2</u></p> <p>INTRODUCTION INTO TRAINING</p> <p>Purpose and goals of the course,</p> <p>Program, educational resources and equipment</p> <p>Mijajlović V.</p> <p>Kolman Z.</p>	<p><u>09:35-13:50 EC-4 (3T + 1P)</u></p> <p>II T-6 EXPLOSIVE CHARGES, KINDS AND MEANS FOR INITIATION IN WATER AND CONSTRUCTION OF THE NET FOR ACTIVATION OF EXPLOSIVE CHARGES</p> <p>a, b, c, d i f</p> <p>practice with educational resources</p> <p>M. Ratković</p>	<p><u>15:00-17:30 EC-3 (practice)</u></p> <p>DIVING ENTRY TEST</p> <p>Mijajlović V.</p> <p>Kolman Z.</p> <p>Detela I.</p> <p>Artač V.</p>
	<p><u>13:15-14:00</u></p> <p>Lunch</p>	<p><u>19:00-21:00</u></p> <p>Individual review and establishment of subject matter</p>	

TUESDAY	<p><u>08:00-11:25 EC-4 (theory)</u></p> <p>II T-1 PROTECTION OF UXO, ACTIVITY OF EXPLOSIVE MATERIALS AND PIROTECHNICAL MIXTURES IN WATER AND THEIR EFFECTS</p> <ul style="list-style-type: none"> Effects of explosive materials and pyrotechnical mixtures and characteristics of individual explosive materials and pyrotechnic mixtures Physical-chemistry characteristics of explosive materials Underwater deflagration of exp. i deton. Effects of explosion in water Danger during explosion in water and safety procedures <p>dr. A. Žabkar</p>	<p><u>11:30-16:35 EC-3 (theory)</u></p> <p>II T-4 DIVERSANT RESOURCES IN WATER</p> <ul style="list-style-type: none"> generally about formational and improvised resources kinds of diversant resources in water elements of diversant resources in water, and their meaning and importance diversant initiating means <p>Laković Dragan</p>	<p><u>16:45-18:20 EC-2 (theory)</u></p> <p>II T-2 FIRST AID</p> <ul style="list-style-type: none"> Review of materials from basic course Kinds of injuries in underwater explosion Appliance of first aid Procedures in case of: <ul style="list-style-type: none"> barotraumas of lungs decompression disease hypothermia hypoxia, anoxia, drowning specific accidents <p>dr. Slobodan Burić</p>
	<p><u>13:00-13:40</u></p> <p>Lunch</p>	<p><u>19:00-21:00</u></p> <p>Individual review and establishment of subject matter</p>	

WEDNESDAY	<p><u>08:00-10:35 EC-3 (theory)</u></p> <p>II T-3 LETHAL MEANS IN WATER</p> <p>mines, torpedoes and other explosive means in water</p> <p>dr. A. Žabkar</p>	<p><u>10:40-15:45 EC-4 (2T + 2P)</u></p> <p>II T-5 INITIATORS AND MECHANISMS, DEVICES ON LETHAL MEANS IN WATER</p> <ul style="list-style-type: none"> basic division basic constructions effects <p>dr. A. Žabkar</p> <p>D. Laković</p>	<p><u>15:50-17:30 EC-2 (practice)</u></p> <p>FIRST AID</p> <ul style="list-style-type: none"> Explosion injuries diving diseases drowning barotraumas of lungs hypoxia and other accidents <p>Dr. Slobodan Burić</p>
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	<u>13:15-14:00</u> Lunch	<u>19:00-21:00</u> Individual review and establishment of subject matter	
THURSDAY	<u>08:00-12:15 EC-5 (3T + 2P)</u> II T-6 EXPLOSIVE CHARGES, KINDS AND MEANS FOR INITIATION IN WATER AND PRODUCTION OF SYSTEM FOR ACTIVATION OF EXPLOSIVE CHARGES Explosive charges <ul style="list-style-type: none">• Means for initiation (fuse electr.)• production of slowburning initiator• production of system (electrical and fuse) EC• remote control• safety procedures at handling and working with explosive means M. Ratković	12:20-13:10 EC-1 (theory) II T-7 METHODS AND MEANS FOR DISCOVERY OF UXO IN WATER <ul style="list-style-type: none">• kinds of detectors• use of detectors Kolman Z.	15:00-17:30 EC-3 (theory) II T-11 APPLICATION OF SAFETY PROCEEDURES <ul style="list-style-type: none">• protection procedures at work with UXO in water• protection procedures at transport (from water, load onboard, transport and unload) dr. A. Žabkar
	<u>13:15-14:00</u> Lunch	<u>19:00-21:00</u> Individual review and establishment of subject matter	

FRIDAY	<u>08:00-13:00 EC-6 (5T+1P)</u> III T-8 DEACTIVATION OR DESTRUCTION OF UXO IN WATER <ul style="list-style-type: none"> • Report making Ž. Keravica	<u>15:00-17:30 EC-4 (3T + 1P)</u> METHODS AND MEANS FOR DETECTION AND EVIDENTION OF UXO IN WATER <ul style="list-style-type: none"> • Kinds of detectors • Use of (sonars) detectors • Demonstration of effects and demo of detection of UXO in water Kolman, Mijajlović, Detela, Artač
	<u>13:10-13:40</u> Lunch	<u>19:00-21:00</u> Individual review and establishment of subject matter

SATURDAY	<p><u>07:50 - 09:35 EC-2 (practice)</u></p> <p>II T-14 PREPARING OF THE PROVING GROUND</p> <p>ing. polygon Dobra Luka</p> <p>Securing the area as per elaborate</p> <p>M. Ratković</p>	<p><u>09:40 – 17:30 EC-7 (1T + 6P)</u></p> <p>II T-6 EXPLOSIVE CHARGES, KINDS AND MEANS FOR INITIATION IN WATER AND PRODUCTION OF NETS FOR ACTIVATION OF EXPLOSIVE CHARGES</p> <ul style="list-style-type: none"> • explosive charges, calculation EC • production and initiation of safety fuses (slow firing) • systems production (electrical and initiation with fuse EC) • systems production (remote control EC) • safety <p>M. Ratković</p> <p>Mijajlović V.</p> <p>Laković D.</p>
	<p><u>13:10 – 13:40</u></p> <p>Lunch</p>	<p><u>19:00-21:00</u></p> <p>Individual review and establishment of subject matter</p>

MONDAY	<p><u>08:00 – 10:25 EC-3 (theory)</u></p> <p>II T-12 TRANSPORT OF UXO IN WATER AND ON LAND</p> <ul style="list-style-type: none"> • kinds of transport • international and republic laws and regulations regarding the transport of explosive means <p>Zvezdan Božić</p>	<p><u>10:40-13:00 EC-3 (2T+1P)</u></p> <p>III B T-1 EXAMINATION OF WATER SPACE AND BOTTOM, DETECTION OF UXO</p> <ul style="list-style-type: none"> • implementation of various techniques for examination of sea bottom with use of various means and devices for detection of UXO <p>Zoran Kolman</p>	<p><u>15:00 – 17:30 EC-3 (1T + 2P)</u></p> <p>II T-9 UNDERWATER CUTTING AND WELDING</p> <p>Instructor Danko Podnar</p>
	<p><u>13:10 – 13:40</u></p> <p>Lunch</p>	<p><u>19:00-21:00</u></p> <p>Individual review and establishment of subject matter</p>	

TUESDAY	<u>08:00 – 15:45 EC-7 (6T + 1P)</u> II T-8 DESTRUCTION OF ELEMENTS IN WATER <ul style="list-style-type: none"> • destruction of sea bottom • destruction of wood elements • destruction of metal elements and constructions in water • destruction of AB elements • ice breaking • involvement of ship propellers with exp. • precaution measure in destruction, tech. security Ž. Keravica	<u>15:50 – 17:30 EC-2 (practice)</u> II T-7 METHODS AND MEANS OF DETECTION <ul style="list-style-type: none"> • use of detectors • Demonstration of effects and demo of detection of UXO in water Z. Kolman
	<u>13:10 – 13:40</u> Lunch	<u>19:00-21:00</u> Individual review and establishment of subject matter

WEDNESDAY	<u>08:00 – 09:35 EC-2 (theory)</u> II B T-2 UXO POSITION MARKING, EVIDENCE AND SAFETY Kolman	<u>09:40 – 10:25 EC-1 (theory)</u> III T-13 ORGANISATION AND IMPLEMENTATION OF INTERVENTION (elaborates, evidences) Z. Božić	
	<u>10:40 – 12:15 EC-2 (theory)</u> III A T-15 DIVING IN WINTER CONDITIONS Z. Kolman	<u>12:15-13:00 EC-1 (practice)</u> III BT-8 PREPARATION FOR DIVING MARKING THE PRACTICE AREA Z. Kolman	<u>15:00 – 17:30 EC-3 (practice)</u> III A T-1 TECHNIQUE OF EXAMINATION OF SEA SPACE <ul style="list-style-type: none"> • squares • »U« technique • circles • compass Kolman-Mijajlović

	<u>13:10 – 13:40</u> Lunch	<u>19:00-21:00</u> Individual review and establishment of subject matter
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THURSDAY	<u>08:00 – 08:45 EC-1 (practice)</u> III A T-8 PREPARATION FOR DIVING Mijajlović-Kolman-Laković	<u>08:50 – 12:15 EC-4 (practice)</u> III A T-7 USE OF UNDERWATER MEANS FOR COMMUNICATION • marks • radio-telephone Mijajlović-Kolman-Laković	<u>15:00 – 17:30 EC-3 (practice)</u> III A T-6 LIFTING WITH PARACHUTE Mijajlović-Kolman-Laković
	<u>13:10 – 13:40</u> Lunch	<u>19:00-21:00</u> Individual review and establishment of subject matter	

FRIDAY	<u>07:50 – 09:35 EC-2 (practice)</u> II T-14 PREPARATION OF TRAINING GROUND • securing as per elaborates • setting the destruction elements Keravica - Laković – Mijajlović	<u>09:40 – 17:30 EC-7 (practice)</u> II A T-8 DESTRUCTION OF ELEMENTS IN WATER • destruction of sea bottom, wood elements in water, metal elements and constructions, AB elements, ice, ship propellers safety measures, secure distance, technical security in explosions in water Keravica - Laković – Mijajlović
	<u>12:40 – 13:15</u> Lunch package	<u>19:00-21:00</u> Individual review and establishment of subject matter

SATURDAY	<u>08:00 – 08:45 EC-1 (practice)</u> III A T-8 PREPARATION FOR DIVING Mijajlović V.	<u>08:50 – 12:15 EC-4 (practice)</u> III A T-4 DEEP SEA DIVING TO 40m (area Rt Veslo) D. Laković, M. Mijajlović	<u>12:20-17:30 EC-4 (practice)</u> III A T-3 DIVING IN CLOSED SPACES (Plava Špilja) D. Laković, M. Mijajlović
	<u>13:10 – 13:50</u> Lunch package	<u>NIGHT OFF</u>	

MONDAY	<p><u>08:00 – 13:00 EC-6 (theory)</u></p> <p>III B T-3 DESTRUCTION OF ELEMENTS IN WATER</p> <ul style="list-style-type: none"> • destructions in ground, rocks from the outside EC, wood elements, round and square cross section • groups of wooden columns • various profiles 2-3 • AB elements <p>Ž. Keravica</p> <p>D. Laković</p>		<p><u>15:00-17:30 EC-3 (practice)</u></p> <p>UXO MARKING AND EVIDENCE</p> <p>With use of charts, GPS, cameras, photo cameras</p> <p>Kolman Z.</p>
	<p><u>13:10 – 13:40</u></p> <p>Lunch</p>	<p><u>19:00-21:00</u></p> <p>Individual review and establishment of subject matter</p>	

TUESDAY	<p><u>07:50 – 08:45 EC-1 (practice)</u></p> <p>III B T-7 PREPARATION OF ING. PRACTICE AREA</p> <p>Securing as per elaborate and setting the elements for destruction.</p> <p>Area Dobra Luka p.o. Luštica.</p> <p>Gačevi, laković, Kolman</p>		<p><u>08:50-17:30 EC-8 (practice)</u></p> <p>III B T-3 DESTRUCTION OF ELEMENTS IN WATER</p> <ul style="list-style-type: none"> • destruction in the ground <ul style="list-style-type: none"> ○ destruction of rocks with outside EC ○ destruction of wood elements ○ destruction of individual elements with circle and square cross section ○ destruction of group of wood columns • destruction of metal elements <ul style="list-style-type: none"> ○ various profile (2-3 pcs) • destruction of AB elements <ul style="list-style-type: none"> ○ AB beams ○ AB plates <p>Ž. Keravica, D. Laković, V. Mijajlović</p>
	<p><u>13:10 – 13:40</u></p> <p>Lunch package</p>	<p><u>19:00-21:00</u></p> <p>Individual review and establishment of subject matter</p>	

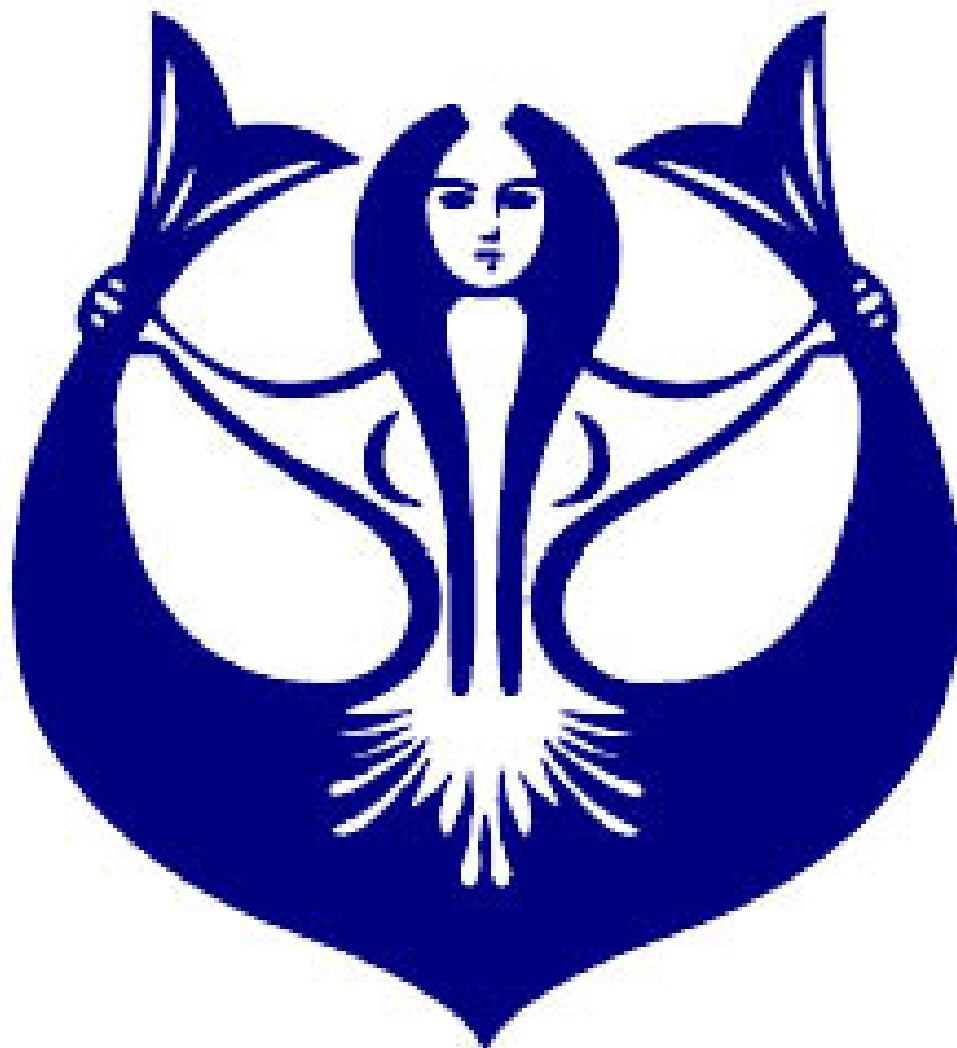
WEDNESDAY	<p><u>07:50 – 09:35 EC-2 (practice)</u></p> <p>III B T-8 PREPARATION FOR DIVING</p> <p>Marking of the position on sea bottom. Setting the catamaran above the mine.</p> <p>Kolman Z. Mijajlović V. Detela I. Artač V.</p>		<p><u>09:40 – 17:30 EC-7 (practice)</u></p> <p>III B T-4 DEATIVION OF UXO, FUSE ON MINE</p> <p>III B T-5 PREPARATION (INSTALATION) OF MINE, LIFTING AND TIGHTENING TO VESSELS</p> <p>III B T-6 TRANSPORT OF MINE IN WATER WITH 3 VESSELS TO POLLYGON DOBREČ FOR DESTRUCTION</p> <p>III B T-4 DESCENDING OF MINE ON SEA BOTTOM</p> <p>- taking the vessels to safe distance, setting el. net from coast and fictive destruction</p> <p>Kolman Z. Mijajlović V. Detela I. Artač V.</p>
	<p><u>13:10 – 13:40</u></p> <p>Lunch paket</p>	<p><u>19:00-21:00</u></p> <p>Individual review and establishment of subject matter</p>	

THURSDAY	<p><u>07:40 – 09:35 EC-2 (practice)</u></p> <p>III A T-8 PREPARATION FOR DIVING</p> <p>TRANSPORT</p> <p>BIJELA – r.SUTORINA</p> <p>BRM</p> <p>Kolman Z. – Mijajlović V.</p>	<p><u>09:40 – 12.15 EC-3 (practice)</u></p> <p>III A T-2 EXAMINATION OF WATER FLOW WITH DETECTOR</p> <p>III B T-5 CARGO LIFTING IN WATER FLOW</p> <p>Kolman Z. Mijajlović V.</p> <p>Detela I. Artač V.</p>	<p><u>15:00 – 17:30 EC-3 (practice)</u></p> <p>REVIEW OF STUDIED MATERIAL</p> <p>PREPARATION FOR EXAMINATIONS</p> <p>Instructors D. Podnar</p>
	<p><u>13:00 – 13:40</u></p> <p>Lunch</p>	<p><u>19:00-21:00</u></p> <p>Individual review and establishment of subject matter</p>	

FRIDAY	08:00 – 12:00 EC-5 (theory)	12:00 – 12:45	13:10 – 13:40
	<p>FINAL EXAMINATIONS</p> <p>REPRESENTATIVE OF URSZS VERBAL – 5 QUESTIONS</p> <p>Members of board</p>	<p>ANALYSIS OF THE COURSE, MARKS, CONCLUSION, QUALIFICATIONS</p>	<p>LUNCH</p> <p>Theory EC-63</p> <p>Practise EC-85</p> <p>TOTAL EC-148</p>
	DEPARTURE OF TRAINEES TO DISTRIBUTED AREAS		

Appendix 2A
(Informative)

Confédération Mondiale des Activités Subaquatiques
World Underwater Federation



C.M.A.S.
STANDARDS & REQUIREMENTS
DIVER AND INSTRUCTOR

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INTRODUCTION

The system of CMAS International Diver Certificates exists to allow divers who have been trained in accordance with the standards of CMAS to have their qualification recognised in countries throughout the world which are part of the CMAS family of divers.

CMAS International Diver Certificates can be obtained in two ways:

1. A diver who holds a diving qualification awarded by a National Federation which is a member of the CMAS Technical Committee, and whose qualifications have been recognised by the Technical Committee, can obtain the CMAS International Diver Certificate which is recognised as equivalent to the national certificate held. In some countries the CMAS International Certificate will be awarded in place of a national certificate.
2. A diver who has been trained by a diving school or centre which is recognised directly by CMAS will be awarded the CMAS International Diver Certificate appropriate to the standard reached.

AIMS OF THE CMAS INTERNATIONAL DIVER CERTIFICATES SYSTEM

It is intended that, no matter where in the world a diver receives training, he or she will be able to visit other areas and be accepted as a diver with competence and experience equal to that indicated by the qualification held. The CMAS International Diver Certificates are evidence that the holder has received training up to the minimum level defined for each grade of certificate. They should then be allowed to participate in diving activities to the extent that a holder of the equivalent national certificate would be.

It is not the aim of the system that the holder of a CMAS International Diver Certificate should be given the equivalent national certificate. However, they should be accepted for training to the next higher level. The principles governing the CMAS International Instructor Certificates are precisely the same.

DEFINITIONS OF DIVER AND INSTRUCTOR GRADES

The system consists of four levels of diver qualification and three levels of instructor qualification. In all cases, increased competence and experience is indicated by an increasing number of stars in the description and the emblem.

ONE STAR DIVER

A diver who is competent in the safe and correct use of all appropriate open water scuba diving equipment in a sheltered water training area and is ready to gain open water diving experience in the company of an experienced diver

TWO STAR DIVER

A diver who has gained some open water diving experience and is considered ready to take part in dives partnered by a diver of at least the same or a higher grade. The two star diver may dive with a One Star Diver in sheltered shallow water.

THREE STAR DIVER

A fully trained, experienced, and responsible diver who is considered competent to lead other divers of any grade in open water.

FOUR STAR DIVER

A three star diver who has attained a higher than average level of knowledge and ability supported by broad experience. He will be competent to use divers and diving in order to achieve major tasks or project objectives.

ONE STAR INSTRUCTOR

A three star diver who has a knowledge of the techniques of diving instruction and is competent in practical instructional skills: he is qualified to direct and certify a full CMAS One Star Diver Course.

TWO STAR INSTRUCTOR

An experienced one star instructor who has the knowledge, skills, and experience required to teach groups of divers in the classroom, pool, and in open water, and to assist in the training of One Star Instructors. He is qualified to direct and certify all CMAS diver levels and all CMAS snorkel Instructor levels.

THREE STAR INSTRUCTOR

A fully experienced two star instructor who is competent to train all grades of divers and instructors and to take responsibility for the conduct of diving schools, centres, and specialised training courses and events.

THE FORM OF THE CMAS INTERNATIONAL DIVERS CERTIFICATES

For each level of diver and instructor, C.M.A.S. produces

- a. a double sided plastic pocket card
The front side of the card is the C.M.A.S. one with
 - a tri dimensional C.M.A.S. hologram
 - the diver or instructor level of the card holder
 For the divers, this side is printed in red and for the instructors in blue.
The reverse side is the Federation or CDC one with
 - on its ¼ upper part, the logo and the name of the federation or CDC
 - the Name, First Name and country of the card holder
 - the number of the card (see below C.M.A.S. numbering system)
 - the expiry date of the card (five year after issuance for all the instructor cards)
- b. a round badge to stick on the wet suit
- c. a wall diploma

PROCEDURE FOR OBTAINING EQUIVALENT GRADES FOR NATIONAL QUALIFICATIONS

Any federation wishing to obtain recognition of their national certificates and equivalence with International Certificates must fulfil certain obligations.

1. The Federation must be affiliated to the CMAS Technical Committee.
2. They must submit full details of their training, evaluation, and certification system for each grade requested to the C.M.A.S. Technical Committee. Alternatively, if they have not established such a system they may undertake to follow the system offered and detailed by CMAS.
3. Subject to approval by the C.M.A.S. Technical Committee, the equivalence will be proposed for approval by the Executive Bureau. Should there be any part of the national system which requires amendment or clarification then it may be necessary for an appointed observer to witness the training or evaluation procedures in use before equivalence can be granted.

PROCEDURE FOR ISSUING INTERNATIONAL CERTIFICATES

From January 1st, 2003, all the C.M.A.S. cards have to be ordered to C.M.A.S. They can be ordered by affiliated federation, recognised CDC or individuals.

Federations and CDC have to use the relevant C.M.A.S. purchase orders which can be fulfilled directly on the C.M.A.S. web site (cmas@cmas2000.org)

Except for the individual orders, all the information required to personalise the card with the information concerning the card holder are in charge of the Federation or the CDC.

Federations and CDC must send quarterly to C.M.A.S. HQ the list of the issued cards with the following data

- Name
- First Name
- Nationality
- Full address of the card holder
- C.M.A.S. code number of the card

C.M.A.S. Numbering system

All the cards must be numbered as follows: **XXX/Y00/ZZ/99/888888**

Where

XXX = Olympic acronym of the country of the federation or CDC

Y = F for Federation
O for CDC

00 = Code number given by C.M.A.S.

ZZ = Level of the card (P1, P2, P3, P4, I1, I2, I3)

99 = Year of issuance in two positions

888888 = Sequential number in 6 position mandatory to initialise to 000001 each year on January 1st

Exemple 1: ESP/F00/I3/02/000025 Is the 25th card issued in 2002 by the Spanish federation and the card holder is a *** Instructor

Exemple 2: If the 168th card issued in 2003 by the Italian federation is a *** Diver, its number will be ITA/F00/03/P3/000168

MEDICAL EXAMINATIONS

National regulations will generally recommend a medical examination to determine the student's fitness to dive before awarding the first International Certificate. Periodical medical examinations carried out by doctors having specialised knowledge of the requirements of diving are also strongly recommended.

A suitable form of medical examination is available from CMAS if required and the assistance of the Medical Commission can also be requested.

ASSESSMENT AND EVALUATION

There are two methods currently in use to assess the competence and ability of divers and instructors under training.

In the traditional system a period of training is generally followed by a final examination in which all of the required skills and knowledge are assessed. This method is usually more physically demanding and more likely to induce stress and apprehension in the student. However, it will prove suitable where these factors are considered appropriate.

In the second, more modern, system the increasing skill and ability of the student are assessed continuously and the student's rate of progress adjusted accordingly. Since the instructor is able to assess the student's competence and knowledge at regular intervals during the training programme, and during their diving experience, far more information can be gained on the student's true strengths and weaknesses and any such weaknesses can be adjusted during the programme. Thus, at the end of the period of training the student will have reached the required level of competence with a minimum need for final assessment.

Although the second system is considered more desirable in the context of teaching diving as a leisure activity, elements of both approaches are usually present in most national systems.

The instructor should consider a skill as acquired if the student has successfully carried it out one or more times in real conditions during the course of one or more dives.

There is no laid down marking system. Each element in the training programme, once carried out successfully, is marked as adequate in the training records. The chronological order of the training programme elements is not inflexible. Certain elements from a later part of the programme can be carried out before the completion of all elements of the earlier part of the programme. This allows for the aptitude of the student to be recognised, and for the practicality of the diving facilities and opportunities to be considered. However, all elements must be completed before the certificate can be awarded. A higher level certificate cannot be awarded before a lower level certificate.

When assessing the difficulty of a diving or training experience it is important to take into account not only the depth at which the activity takes place, but also the temperature of the water and its clarity.

Suggested depth ranges are shown in the 'Requirements' section for each certificate.

DIVING LOG BOOKS

It is compulsory that all students maintain good records of their diving and training experience. Dives should be noted in a diving book. While most national log book, and the award of qualifications may be noted in this, or another federations will supply these, a log book is also available from CMAS.

VALIDITY OF INTERNATIONAL CERTIFICATES

The period of validity placed on the International Diver Certificates issued by CMAS is that of their equivalent National Certificate. International Instructor Certificates have an expiry date fixed at five year from the date of their issue.

AWARDING CMAS INTERNATIONAL DIVING CERTIFICATES

All divers wishing to obtain a CMAS International Diving Certificate must satisfy certain conditions.

1. They must
 - a. be a member of .a Federation which is a member of the CMAS Technical Committee, or
 - b. be a student at a CMAS recognised diving school.
2. In the case of 1 (a) above, they should hold the national diving certificate of their Federation which has been recognised by the International Certificates Commission as being equivalent to the appropriate CMAS International Certificate.
3. It is recommended that they hold a current diving medical certificate confirming their fitness to dive.
4. They must satisfy all other conditions of the certificates detailed in the following section.
5. They must be familiar with the CMAS Code of International Diving Signals, and the International Diving Code.

The detailed conditions and recommended content of the training course for each certificate level will be found in the CMAS publication "CMAS Training Programmes and Standards". The following is a summary of this information.

CMAS ONE STAR DIVER

a. *Definition*

A diver who is competent in the safe and correct use of all appropriate open water scuba diving equipment in a sheltered water training area and is ready to gain open water diving experience in the company of an experienced diver.

b. *Entry requirements*

Must be at least 14 years old.

c. *Course content*

Knowledge

Must have a basic understanding of :

Pressure/volume relationships and their effect on the diver and his equipment.

What the body needs to sustain life and the complications caused by being underwater.

The purpose, function, and features of sports diving equipment to be used in the course, and its correct use.

The rules of safe diving, self help, and elementary rescue procedures.

The techniques of no-decompression diving.

Skills

Be competent in the preparation, care, and use of sports diving equipment, adjustment of buoyancy, maintenance of water-free air ways.

Be able to control movement in all directions and to swim using fins efficiently and economically, and be able safely to enter and leave the water.

Be able to perform self-rescue techniques and basic buddy rescue techniques.

Be able to act as a member of a diving group under supervision, and demonstrate the required discipline.

Motion from G.A. the CMAS one star diver (must) have a minimum of 5 open water dives.

d. *Assessment*

In the 'continuous assessment' system the above knowledge and skills will be assessed at various points during the course, and the certificate will only be awarded if the diver is judged to have reached the required standard

In order to achieve the level of CMAS One Star Diver the students should demonstrate in the course of the programme that they have the ability to carry out the following in sheltered water.

1. Enter the water by jumping or diving and swim free style at least 100 metres, without the use of equipment.
2. Prepare and fit diving equipment including cylinder, regulator, life jacket/B.C., mask, fins, weight belt, snorkel, diving suit appropriate to the conditions envisaged, and other accessories.
3. Demonstrate techniques for entering and leaving the water under different conditions; jetty, diving boat, small boat, beach.
4. Demonstrate techniques for leaving the surface and making a descent, and for making a controlled ascent to the surface.
5. Demonstrate techniques for maintaining position and self-support at the surface, with and without use of mask and regulator.
6. Refit mask underwater, and remove and replace regulator mouthpiece.
7. Demonstrate familiarity with alternate air sources and/or shared breathing techniques, and their use in an emergency, together with the associated safety signals.
8. Demonstrate techniques for controlling buoyancy underwater, and for providing positive buoyancy at the surface.

A test, using oral or written techniques, can be used to establish that the diver's standard of knowledge matches that outlined in 'Knowledge' above.

The assessment will normally be made in accordance with the rules of the National Federation, but when awarded directly at a CMAS recognised diving school the assessment must be made by an Instructor of at least CMAS 1 Star grade.

CMAS TWO STAR DIVER

a. Definition

A diver who has gained some open water diving experience and is considered ready to take part in dives partnered by a diver of at least the same or higher grade.

The two star diver may dive with a one star diver in sheltered shallow water.

b. Entry requirements

1. Must be at least 15 years old.
2. Should have a 1 Star CMAS Diver certificate or equivalent
3. No specified number of dives are necessary to start the course
4. Must have minimum 20 open water dives at time of certification, of which at least 10 should be in the 10-30 meter range.

A dive must be minimum 20 minutes and maximum 2 dives per day.

c. Course content

Knowledge

Must have a basic understanding of :

Diving physics and physiology, the causes and effects of diving-related illnesses and disorders.

Basic first aid, resuscitation techniques.

The problems associated with diving to greater depths, calculation of air requirements, correct use of decompression tables.

The selection of dive sites and the principles of dive planning.

The principles and practices of underwater navigation.

Skills

Be competent in the use of mask, fins, and snorkel.

Be able to swim on the surface wearing full diving equipment but using a snorkel.

Be fully familiar with use of the diving equipment at medium depths.

Be competent in self-rescue and buddy rescue techniques from depths in the 10-30 metre range.

Be familiar with the use of buoyancy adjustment equipment.

Be competent in the use of decompression tables for single and consecutive dives.

Be competent in practise of underwater navigation.

d. Assessment

In the 'continuous assessment' system the above knowledge and skills will be assessed at various points during the course, and the certificate will only be awarded if the diver is judged to have reached the required standard.

In order to achieve the level of CMAS Two Star Diver the students should demonstrate in the course of the programme that they have the ability to carry out the following under diving conditions.

1. Demonstrate competence in the use of mask, fins, and snorkel, by swimming 800 metres, with a snorkel dive to 5m depth for a horizontal distance of 10m.
2. Be able to swim on the surface wearing full diving equipment but using a snorkel, at least 500 metres, and swim on the back or side for 100m without using snorkel or regulator.
3. Demonstrate full familiarity with the equipment while diving in the 10-30 metre range, replacing mask and regulator mouthpiece.
4. Demonstrate self-rescue and buddy rescue techniques from depths in the 10-30 metre range, followed by surface tow of victim.
5. Demonstrate ability to assist a diving partner who is 'out of air' through use of alternate air source or buddybreathing techniques, including a safe return to the surface.
6. Demonstrate use and control of buoyancy adjustment equipment without use of emergency air supply.
7. Demonstrate use of decompression tables for single and consecutive dives.
8. Be able to act as a member of a diving team, both while submerged, and during the surface preparation for the dive.
9. Demonstrate ability to navigate underwater with and without use of compass over a distance of 50 metres.

A test, using oral or written techniques, can be used to establish that the diver's standard of knowledge matches that outlined in 'Knowledge' above.

The assessment will normally be made in accordance with the rules of the National Federation, but when awarded directly at a CMAS recognised diving school the assessment must be made by an Instructor of at least CMAS 2 Star grade.

CMAS THREE STAR DIVER

a. *Definition*

A fully trained, experienced, and responsible diver who is considered competent to lead other divers of any grade in open water dives.

b. *Entry requirements*

1. Must be at least 16 years old.
2. Should have a 2 Star CMAS Diver certificate or equivalent
3. No specified number of dives are necessary to start the course
4. Must have minimum 50 dives at the time of certification of which 20 dives should be on the 30 meter range.

c. *Course content*

Knowledge

Must have a comprehensive understanding of :

Diving physics and physiology, the causes and effects of diving-related illnesses and disorders and their treatment.

Diving first aid, resuscitation techniques.

The problems associated with diving beyond 30 metres, calculation of air requirements, correct use of decompression tables.

The selection of dive sites, the principles of dive planning, and the selection and assessment of divers.

The principles and practices of underwater navigation.

The basic principles of seamanship and small boat handling.

Hazards due to flora and fauna or resulting from local and weather conditions.

The legal responsibilities of divers.

Skills

Be fully competent and familiar with sports diving equipment,* and its use at all depths.

Be competent in the organisation of diving activities for groups both from the shore and from boats.

Be competent in self-rescue and buddy rescue techniques from depths in the 10-30 metre range, and the care and treatment of victims.

d. *Assessment*

In the 'continuous assessment' system the above knowledge and skills will be assessed at various points during the course, and the certificate will only be awarded if the diver is judged to have reached therequired standard.

In order to achieve the level of CMAS Three Star Diver the students should demonstrate in the course of the programme that they have the ability to carry out the following under diving conditions.

1. Demonstrate competence in the use of mask, fins, and snorkel, by swimming 1500 metres, followed by a 10 metre surface dive to recover an object.
2. Demonstrate fitness and ability to support self and/or victim following fast surface swim of 100 metres and 20 second surface dive, a surface period of 10 seconds maximum followed by a further snorkel dive to 3m to recover a mannequin of 1.5 kg apparent weight, to be towed on the surface for 50m.
3. Wearing full equipment, swim on the surface 1000 metres using snorkel.
4. Demonstrate self-rescue and buddy rescue techniques from depths in the 10-30 metre range, followed by surface tow of victim.
5. Demonstrate ability to navigate underwater with and without use of compass during a dive ..
6. Demonstrate ability to handle ropes and tie knots underwater.
7. Be able to participate in the normal running of a dive boat.
8. Be able to lead a group underwater, maintaining control, following a dive plan and route, and returning safely to the surface from any depth range.
9. Demonstrate the ability to use charts and tide tables in the selection and location of dive sites.

A test, using oral or written techniques, should be used to establish the diver's standard of knowledge.

The assessment will normally be made in accordance with the rules of the National Federation, but when awarded directly the assessment must be made by an Instructor of at least CMAS 2 Star grade and confirmed by the responsible National Technical Committee.

CMAS FOUR STAR DIVER

a. Definition

A three star diver who has attained a higher than average level of knowledge and ability supported by broad experience. He will be competent to use divers and diving to achieve major tasks or project objectives.

b. Entry requirements

1. Must have held a 3 Star Diver Certificate for at least 2 years.
2. Must have been a member of his Federation for at least 5 years.
3. Must have carried out at least 100 dives, under varying conditions, since obtaining 3 Star Diver Certificates.

c. Course content

It is not considered that this level will be reached following a course of fixed content, but rather as the result of experience acquired over an extended period and incorporating a broad range of conditions and requirements.

d. Assessment

The diver must be able to prove his capabilities in organising diving expeditions and other diving activities with a particular stress on safety and emergency procedures, and by proving his competence in a given specialised area or in a scientific discipline.

The assessment will be made at a national level by a panel composed of 3 Star Instructors and confirmed by the responsible National Technical Committee.

CMAS ONE STAR INSTRUCTOR

a. Definition

A three star diver who has a knowledge of the techniques of diving instruction and is competent in practical instructional skills: he is qualified to direct and certify a full CMAS One Star Diver course.

b. Entry requirements

1. Must hold a 3 Star Diver Certificate.
2. Must be at least 18 years old.

c. Course content

Knowledge

Must have a basic understanding of :

The principles of teaching.

The learning process.

Instructional methods appropriate to sport diving.

Equipment used in diving instruction.

Skills

Be able to control and lead a group of students in sheltered open water.

Be able to instruct a group of students in sheltered open water.

Be able to teach the contents of the 1 Star Diver course to a group of students in a surface/classroom situation and in open water

Be able to communicate effectively with the students at all times.

d. Assessment

In the 'continuous assessment' system the above knowledge and skills will be assessed at various points during the course, and the certificate will only be awarded if the instructor is judged to have reached the required standard.

If the 'testing' system is used then the final assessment should establish the instructor's ability to carry out the following under sheltered water diving conditions.

Skills

1. Demonstrate the ability to control and lead a group of students in a dive in sheltered open water.
2. Demonstrate the ability to instruct a group of students in basic diving techniques in sheltered open water.
3. Demonstrate familiarity with the contents of the 1 Star Diver course and the ability to teach a group of students in a surface/classroom situation and in open water.
4. Demonstrate the ability to communicate effectively with the students at all times.

The assessment will be made at a national level by a panel composed of 2 Star and 3 Star Instructors.

CMAS TWO STAR INSTRUCTOR

a. Definition

An experienced one star instructor who has the knowledge, skills, and experience required to teach groups of divers in the classroom, pool and open water, and to assist in the training of One Star Instructor. He is qualified to direct and certify all CMAS diver levels and all CMAS Snorkel Instructor levels..

b. Entry requirements

1. Must hold a 1 Star Instructor Certificate.
2. Must be at least 19 years old.
3. Must have gained further practical instructional experience since obtaining 1 Star Instructor Certificate.

c. Course content

Knowledge

Must have a complete understanding of :

The Principles of teaching.

The learning process.

Instructional methods appropriate to sport diving.

Equipment used in diving instruction.

Skills

Be able to control and lead a group of students in varying diving conditions.

Be able to instruct a group of students in open water conditions.

Be able to teach the contents of the 1,2 and 3 Star Diver courses to a group of students in a surface/classroom situation and in open water.

Be able to communicate effectively with the students at all times.

d. Assessment

In the 'continuous assessment' system the above knowledge and skills will be assessed at various points during their course, and the certificate will only be awarded if the instructor is judged to have reached the required standard.

If the 'testing' system is used then the final assessment should establish the instructor's ability to carry out the following under sheltered water diving conditions.

Skills

1. Demonstrate the ability to control and lead a group of students in a dive to take place in open water.
2. Demonstrate the ability to instruct a group of students in selected diving techniques in sheltered and open water.
3. Demonstrate familiarity with the contents of the 1,2 and 3 Star Diver courses and the ability to teach a group of students in a surface/classroom situation and in open water.
4. Demonstrate the ability to communicate effectively with the students at all times.

The assessment will be made at a national level by a panel composed of 3 Star Instructors.

CMAS THREE STAR INSTRUCTOR

a. Definition

A fully experienced two star instructor who is competent to take responsibility for the conduct of diving schools, events, to train all grade of divers and instructors and centres, and specialised training courses and

b. Entry requirements

1. Must hold the 2 Star Instructor Certificate.
2. Must be at least 20 years old.
3. Must have gained considerable instructional experience since obtaining 2 Star Instructor Certificate, probably including experience at Regional or National level.

c. Course content

It is not considered that this level will be reached following a course of fixed content, but rather as the result of experience acquired over an extended period and incorporating a broad range of conditions and requirements.

The instructor should have an excellent knowledge of all subjects covered in the diver and instructor courses up to this grade, and should be thoroughly competent to teach all theoretical and practical aspects of these courses.

Additionally he should be capable of applying teaching skills and experience to related topics not forming part of a standard course.

d. Assessment

In the 'continuous assessment' system the above knowledge and skills will be assessed at various points during the instructor's diving experience and the certificate will only be awarded if the instructor is judged to have reached the required standard.

If the 'testing' system is used then the final assessment should establish the instructor's ability to carry out the following under all diving conditions.

Skills

1. Demonstrate the ability to control and lead a group of students in a dive planned to take place in open water.
2. Demonstrate the ability to instruct a group of students in selected diving techniques in sheltered and open water.
3. Demonstrate familiarity with the contents of the full range of Diver and Instructor courses and the ability to teach groups of students in a surface/classroom situation and in open water.
4. Demonstrate the ability to communicate effectively with students or other audiences at all times.
5. Demonstrate the ability to compose a training programme to fit any stated requirement, location, or situation.

The assessment will be made at a national level by a panel composed of selected 3 Star Instructors appointed by the responsible National Technical Committee.

**Appendix 2B
(Informative)**

Confédération Mondiale des Activités Subaquatiques
World Underwater Federation



**C.M.A.S. Diver
TRAINING PROGRAM**

THE C.M.A.S. INTERNATIONAL DIVERS CERTIFICATES SYSTEM

The C.M.A.S. has established standards which form the basis of a system of International Divers Certificates, which are recognised by all national federations and other bodies which are member of the C.M.A.S. Technical Committee.

The standards describe the knowledge and skills required in order for a diver to be granted the appropriate C.M.A.S. International Divers Certificate.

The certificates may be awarded as an equivalent to a national qualification held by the divers, or may be awarded directly by a C.M.A.S. recognised Diving School or by certain national federations.

The standards describe four grades of divers

- One Star Diver *
- Two Stars Diver **
- Three Stars Diver ***
- Four Stars Diver ****

Details of the standards will be found in the C.M.A.S. publication “ Standards and Requirements ”

In most cases divers will be trained in accordance with the training programmes used by their national federation, and these will have been closely considered during the process of granting approval for International Certificate Equivalents.

The Diver Training Programmes outlined here are intended to:

1. Act as an example to federations wishing to become members of the C.M.A.S. Technical Committee, and aiming to issue divers certificates which will have equivalent C.M.A.S. International Divers Certificates.
2. Indicate to existing members of the Technical Committee the current standards of training considered necessary in order to reach the minimum levels of proficiency required for the award of C.M.A.S. International Divers Certificates
3. Act as a basis for the training programmes to be adopted by C.M.A.S. recognised Diving Schools for courses resulting in the direct issue of C.M.A.S. International Divers Certificates.

The programmes are described as a sequence of theoretical and practical lessons, wherever possible the practical lesson builds on theoretical knowledge already taught to the student. Suggestions are offered on the time each lesson can be expected to occupy in a normal programme.

The lessons have been given codes to describe their place in the programmes. For example, “ 2T6 ” is a theoretical lesson (T) for two stars diver (2) and is the sixth in the sequence (6). 1P2 is therefore the second practical lesson in the one star diver programme.

ONE STAR DIVER

TRAINING PROGRAMME

A diver who is competent in the safe and correct use of all appropriate open water scuba diving equipment in a sheltered water training area is ready to gain open water diving experience in the company of an experienced diver. Practical teaching sessions should take place in a swimming pool or confined water with swimming pool like conditions.

THEORY LESSONS

- 1T1** Course aims and administration
- 1T2** Introduction to equipment
- 1T3** Elementary signals
- 1T4** Pressure/Volume relationships
- 1T5** Principles and use of SCUBA
- 1T6** Basic physiology
- 1T7** Buoyancy devices
- 1T8** Diving suits & other equipment
- 1T9** Equipment care
- 1T10** Self Rescue & Buddy Rescue
- 1T11** Safe Diving Practices
- 1T12** Site selection, Conservation

PRACTICAL LESSONS

- 1P1** Introduction to equipment
- 1P2** SCUBA Skills 1
- 1P3** Snorkelling and SCUBA Skills 2
- 1P4** SCUBA Skills 3
- 1P5** SCUBA Skills 4
- 1P6** Rescue Skills
- 1P7** SCUBA Skills review
- 1P8** Skills assessment
- 1P9** 5 Open Water Dives

CONTENT OF THEORETICAL LESSONS

1 T 1 COURSE AIMS AND ADMINISTRATION

This introductory lesson should explain the purpose of the training programme and its position in the diver certification system, the relation ship between the school/club/federation and C.M.A.S., and the basis of the C.M.A.S. International Divers Certificate System. Administrative details concerning meeting times and location, timetable, equipment to be supplied or brought. Aims of the course, organisation of the school/club.

Logbook and qualification records.

(Time: 20 minutes)

1 T 2 INTRODUCTION TO DIVING EQUIPMENT

The selection, purpose and function of the mask, fins, snorkel and weight belt.

Mask, fins, snorkel: construction, features, fitting, maintenance, testing, suitability

Weight belt: features, fitting, release operation, importance of neutral buoyancy

Brief description of SCUBA elements

Equipment to be used on the course

Warnings about breath-holding, squeeze

(Time: 30 minutes)

1 T 3 ELEMENTARY SIGNALS

Reasons for using hand signals underwater and at the surface.

Importance of using the C.M.A.S. International Code of Underwater Signals.

Diver to diver signals

Diver to surface party signals

Signals to be used during course

Importance of response to signals

(Time: 25 minutes)

1 T 4 PRESSURE/VOLUME RELATIONSHIP

The basic physics affecting diving

Atmospheric pressure and hydrostatic pressure, absolute pressure.

Relationship between pressure and volume (Boyles laws).

Gases under pressure, composition of air.

Effects of pressure on body air spaces, changes in pressure.

Compression problems: mask squeeze, ear and sinuses under pressure, equalisation.

Expansion problems, breath holding..

Buoyancy factors and adjustment

(Time: 40 minutes)

1 T 5 PRINCIPLES AND USE OF SCUBA

The function of SCUBA, in principle only. Reduction of air pressure from high to ambient. Ability to carry large amount of air with the diver..

The air cylinder, its charging and care

The regulator, its function and care

Pressure gauges and other ancillary equipment

Using SCUBA, preparation and fitting.

(Time: 30 minutes)

1 T 6 BASIC PHYSIOLOGY

The human life support system, the respiratory system, the metabolic process.

The gas exchange within the lungs, the role of each gas.

Exhaustion, drowning, hypoxia, hypothermia, prevention.

(Time: 40 minutes)

1 T 7 BUOYANCY DEVICES

Importance of wearing a buoyancy compensator for comfort during the dive and for use in an emergency, at the surface or underwater.

Essential features of different types.

Suitability for different types of diving.

Dangers of rapid ascent, controlling ascent

Use for buoyancy adjustment, recommended procedure

Methods of inflation, MP air, HP air, oral, CO₂, advantages / disadvantages

Preparation, fitting, care

(Time: 30 minutes)

1 T 8 DIVING SUITS AND ANCILLARY EQUIPMENT

Need for protection in all but warmest waters, abrasion and marine life protection. Equipment to be used on course. Advantages / Disadvantages of different types.

Wet / dry suits.

Selecting a suit, type.

Fitting and care.

Instrumentation, depth gauge, watch, compass, HP gauge, combinations, decompression computers.

Lamp, knife, buoys, lines, bag, slate.

(Time: 30 minutes)

1 T 9 EQUIPMENT CARE

Importance of a proper maintenance procedure for all diving equipment.

Pre-dive preparation, after-dive care.

Value of fresh water rinse and general cleanliness

Special care for perishable items, rubber, suits.

Prevention of corrosion to metal parts.

Protection for damage in transport.

Regular testing and servicing.

Storage, off-season.

(Time: 30 minutes)

1 T 10 SELF RESCUE AND BUDDY RESCUE

Accident prevention through careful planning.

Recognise the signs and take early action.

Assess the required action and select, correct course of action.

Self-help and self-rescue techniques.

Correct techniques for shared ascent, buoyant ascent, and free ascent.

Expired air resuscitation, on the surface and in the water.

Towing and landing a victim.

Summoning and using help.

(Time: 40 minutes)

1 T 11 SAFE DIVING PRACTICES

The correct conduct for open water diving practice.

The dive leader, his role in the dive.

Dive planning, to identify and avoid problem areas.

The buddy system and essential elements in dive safety.

Pre-dive preparation, equipment checks, briefing.
Entry, buoyancy check, descent, conduct of the dive, ascent, surfacing, leaving the water.
Emergency procedures, separation.
The International Diving Code.
International Code of Signals.
(Time: 40 minutes)

1 T 1 2 SITE SELECTION AND CONSERVATION

How to choose a dive site.
What features to look for and what to avoid.
The effect of weather and tides.
Marine and aquatic life, what to look for, how to recognise it.
Attitude to marine life and the environment, importance of conservation.
Reasons to dive and things to do.
Dangerous marine life, avoidance, treatment.
(Time: 30 minutes)

CONTENT OF PRACTICAL LESSONS

1 P 1 INTRODUCTION TO EQUIPMENT

In this course the student will be introduced in mask, fins and snorkel and their use, and will gain an appreciation of the effects of mask squeeze and ear clearing in shallow water. The buddy system will be employed from the first opportunity.
Fitting the mask, adjustment, demisting, ear clearing.
Fitting the snorkel, surface breathing, clearing by blowing and displacement.
Fitting the fins, adjustment, correct finning action, practice period.
Surface swimming, surface dives, and surfacing technique using mask, fins and snorkel.
Treading water, vertical finning, surface support stroke.
Brief introduction to SCUBA, fitting, breathing and swimming.
Adjusting buoyancy.
(Time: 60 minutes)

1 P 2 SCUBA SKILLS 1

Assembling the SCUBA set, fitting and checking the regulator, air supply, fit of harness, buoyancy/weight equipment.
Entering the water, breathing from the aqualung in different attitudes, checking and adjusting buoyancy.
Finning and moving while wearing SCUBA.
Remove, replace and clear mouthpiece.
Remove, replace and clear mask.
Breathe from alternative air supply.
Static sharing SCUBA.
Surfacing and leaving water.
(Time: 60 minutes)

1 P 3 SNORKELLING AND SCUBA SKILLS 2

Snorkelling skills, entering the water, leaving the water.
Feet first descent.
Surface dives while swimming.
Longer breath-hold dives.
Removing and recovering basic equipment.
Using and fitting a weight belt.
Repeat mask and snorkel clearing
SCUBA skills, entering and leaving the water.
Improve mouthpiece clearing and mask clearing technique.
Improve finning technique.
Demonstrate buoyancy control.
Share SCUBA following “ out of air ” simulation.
Remove SCUBA at surface.
(Time: 60 minutes)

1 P 4 SCUBA SKILLS 3

Further entry techniques.
Improve basic techniques, mask clearing, finning.
Mobility exercises, rolls, buoyancy control.
Remove and replace weight belt underwater.
Remove and replace SCUBA underwater.
Surface, fit snorkel and swim on surface using snorkel while wearing SCUBA, replace SCUBA mouthpiece and descend.
Exit from water via ladder from deep water.
(Time: 60 minutes)

1 P 5 SCUBA SKILLS 4

Improve familiarity with buoyancy device or life-jacket.
Inflate for surface support.
Control buoyancy at bottom and in mid water.
Control rate of ascent by release of air, demonstrate ability to stop.
Use of buoyancy for lift in an emergency, controlled buoyancy lift.
Rapid dumping of air, use of alternative inflation systems.
(Time: 60 minutes)

1 P 6 RESCUE SKILLS

Controlled buoyancy lift of victim to surface.
Surface support and towing.
Correct position for expired air resuscitation at surface, importance of neck extension.
Calling and signalling for help.
(Time: 60 minutes)

1 P 7 SCUBA SKILLS REVIEW

In this lesson, all the equipment which will be used on open water dives, including suit, is introduced and the skills already learned are practised while fully equipped.
Exercises are carried out in the full depth of sheltered water available and the opportunity is taken for final improvement of any techniques still required.
(Time: 60 minutes)

1 P 8 SKILLS ASSESSMENT

All skills learned so far are checked and assessed to ensure that they can be performed at the required standard. The combination of exercises is performed in sequence will also provide a measure of the student's fitness and stamina.
It must be remembered that, after this lesson, suitable students are considered ready to continue their training in open water.
(Time: 60 minutes)

On completion of each lesson the instructor should assess the student's ability and ensure that they have adequately acquired the skills included in each lesson. It is particularly important that this assessment is made during lessons 1P4 and 1P6.

1 P 9 5 OPEN WATER DIVES

TWO STAR DIVER

TRAINING PROGRAMME

The two star diver is a diver who has gained some open water diving experience and is considered ready to take part in dives partnered by a diver of at least the same or a higher grade. The two star diver may dive with a One Star Diver in sheltered shallow water .

The course must be conducted by qualified instructors and supervised by an instructor of at least one star grade. The early practical teaching sessions should take place in sheltered open water, following which the diver should gain experience in a broad range of varying water conditions.

THEORY LESSONS

- 2T1 Diving related illnesses**
- 2T2 First aid and rescue procedures**
- 2T3 Calculating air requirements practice**
- 2T4 Nitrogen absorption**
- 2T5 Deep diving**
- 2T6 Decompression tables**
- 2T7 Dive planning and organisation**
- 2T8 Underwater Navigation**

PRACTICAL LESSONS

- 2P1 Open water diving procedures**
- 2P2 Rescue skills**
- 2P3 SCUBA skills – open water**
- 2P4 Underwater Navigation**
- Dives 1 -20**

Knowledge Assessment

Skills Assessment

CONTENT OF THEORETICAL LESSONS

2 T 1 DIVING RELATED ILLNESSES

Revision of effects of pressure on the body, gas laws, partial pressures.
Ear and sinus disorders: causes, prevention, treatment
Burst lung (Pneumothorax, Emphysema), symptoms, causes, first aid, treatment.
Hypoxia: causes, treatment.
Decompression sickness (basic introduction only).
Nitrogen narcosis: causes, symptoms, treatment.
Carbon monoxide poisoning: causes, symptoms, treatment.
Carbon dioxide poisoning: causes, symptoms, treatment.
Oxygen poisoning: causes, symptoms, treatment.
Exhaustion, hypothermia, hyperthermia.
Drowning: causes, first aid, treatment.
(Time: 60 minutes)

2 T 2 FIRST AID AND RESCUE PROCEDURES

Expand on lesson 1T10, and prepare for lesson 2P2.
Analysis of the accident.
Whether to assist or rescue.
Assess, plan, act
Reaching the victim, recovering the victim.
Towing methods.
Landing the victim, on a beach, on a boat.
Techniques to be employed and why.
Expired air resuscitation
External cardiac compression.
Aftercare.
(Time: 40 minutes)

2 T 3 CALCULATING AIR REQUIREMENTS

Importance of pre-dive planning.
Identifying stages of dive: descent, main dive, ascent, stops, reserve.
Air consumption rates.
Cylinder sizes and pressures.
Calculating air available for the dive.
Calculating air needed for the dive.
Practice calculations.
(Time: 40 minutes)

2 T 4 NITROGEN ABSORPTION

Absorption of gases in liquids, absorption of air into body tissues.
Toxic effects of gases.
Physiological problems; narcosis.
Decompression sickness, mild forms, severe forms.
First aid and treatment for decompression sickness.
Avoidance of decompression sickness.
(Time: 40 minutes)

2 T 5 DEEP DIVING

The problems related to deep diving.
Reasons for and against deep diving.
Physiological problems, narcosis, decompression.
Depth limitations.
Physical problems, buoyancy, thermal isolation, air density and purity.
Equipment considerations.
Planning requirements.
Response to emergencies.
(Time : 30 minutes)

2 T 6 DECOMPRESSION TABLES

Used to avoid decompression sickness and related problems.
Principle of operation, review of nitrogen absorption.
The form and layout of the tables.
Using tables for no-stop diving.
Single dives.
Multiple dives.
Diving at altitude.
Flying after diving.
Keeping records, log-books.
Instrumentation used.
Importance of planning.
Practice in decompression table use.
(Time: 90 minutes)

2 T 7 DIVE PLANNING AND ORGANISATION

Planning is an essential element of diving safety.
Avoid the predictable problems.
Make allowance for all predictable needs and for emergencies.
Planning your own dives.
Site selection, objectives, timing, personnel, weather, tides.
Pre-dive preparation.
On-site organisation.
(Time: 90 minutes)

2 T 8 UNDERWATER NAVIGATION

Underwater navigation, without a compass.
The compass, types, suitability.
How to use a compass when diving.
Taking a bearing, planning a course.
(Time: 30 minutes)

KNOWLEDGE ASSESSMENT

Before granting the qualification, the instructor should ensure that the student has retained and understood the knowledge required to be a safe two star diver. The assessment will usually take the form of a prepared written text using “ multi choice ” questions which allow a coverage of many topics in a short period. Weaknesses which are suggested by the result of this paper can then be investigated by further oral questioning if necessary.

CONTENT OF PRACTICAL LESSONS AND EXPERIENCE DIVE

2 P 1 OPEN WATER DIVING PROCEDURES

Practice snorkelling skills in open water, medium distance swim with surface dives.
Experience in dressing in all appropriate equipment for dive, equipment checks, buddy checks.
Water entry, buoyancy checks.
Leaving the surface.
Buddy diving, conduct during the dive.
Exchange signals.
Ascent and surfacing procedure.
Leaving the water.
Debriefing and equipment aftercare.
(Time: 120 minutes)

2 P 2 RESCUE SKILLS

Following lesson 2T2, the skills described should be practised in an open water situation.
Towing victim on the surface, various methods.
In-water E.A.R.
Removing equipment.
Towing and landing to a beach, to a small boat.
Practice E.A.R. and E.C.C. on land.
Complete emergency exercise.
(Times: 90 minutes)

2 P 3 SCUBA SKILLS OPEN WATER REVIEW

Improve diver's confidence by repeating skills acquired in one star course in the open water situation.
Various forms of water entry.
Buoyancy adjustment procedures, use of weight belt and buoyancy compensator.
Review surface and underwater signals.
Remove and refit mask at medium depth.
Remove and replace mouthpiece at medium depth.
Practise buddy breathing and use secondary air supply or octopus.
Leaving the water on a beach, into a boat. (Time: 90 minutes)

2 P 4 UNDERWATER NAVIGATION

Using a compass on land.
Using a compass on the surface.
Using a compass underwater.
Swimming in straight lines, swimming reciprocal courses.
(Time: 60 minutes)

EXPERIENCE DIVES

The 20 dives which go to make up the experience of the two star diver should cover a suitably wide range of different diving conditions and, as far as possible, include the following:

- Beach dives with sloping entry.
- Sea water dives.
- Fresh water dives.
- Diving from small boats.
- Diving from larger boats.
- Limited visibility dives.
- Diving during the night
- Moving water dives
- Dives in cold water.
- Dives to 25 / 30 metres.

It is appreciated that this combination of variety of dives will not always be available to the dive centre or club. However, the underlying principle is that the diver's experience should equip him for a variety of diving conditions, and should not represent a repeat of a similar experience on each occasion.

Each dive should be at least 20 minutes duration and should be in the 10 – 30 metres depth range.

SKILLS ASSESSMENT

The diver's ability should be assessed by the instructor during the course of the dives being carried out. It will not normally be necessary to carry out a final assessment of all skills at the end of the course, but this can be done if the need exists. It is preferable to check one or two skills on each experience dive and to look for a steadily improving ability over this period.

THREE STAR DIVER

TRAINING PROGRAMME

The three star diver is a fully trained, experienced and responsible diver who is considered competent to lead other divers of any grade in open water.

The course must be conducted by qualified instructors and supervised by an instructor of at least two star grade. The course will require the availability of suitable open water diving sites, together with some specialised facilities.

The dive experience element of the qualification will require the diver to accumulate a broad range of experience under varying conditions and varying depths.

THEORY LESSONS

- 3T1 Small boat handling**
- 3T2 Underwater navigation**
- 3T3 Underwater search and recovery**
- 3T4 Compressor operation**
- 3T5 Accident management**
- 3T6 Organising a group dive**
- 3T7 Physics / physiology review**
- 3T8 Diving equipment review**

Knowledge assessment

PRACTICAL LESSONS

- 3P1 Small boat handling**
- 3P2 Underwater navigation**
- 3P3 Underwater search and recovery**
- 3P4 Compressor operation**
- 3P5 Assisting a dive organiser**
- 3P6 Acting as a dive organiser**
- Further experience as dive organiser:**
- 40 experience dives**

Skills assessment

CONTENT OF THEORETICAL LESSONS

3 T 1 SMALL BOAT HANDLING

A preliminary to practical experience in small boat handling.
Basic seamanship, weather, tides.
“Rules of the road”, obligations of the boat handler.
Buoyage.
Ropes and their use, knots.
Using boats for diving, types, suitability.
Outboard engines and their use.
Safety equipment and special equipment.
Boat handling techniques, launching, anchoring, loading, low speed / high speed, emergency action.
(Time: 60 minutes)

3 T 2 UNDERWATER NAVIGATION

Underwater navigation, without a compass.
The compass, types, suitability.
How to use a compass when diving.
Taking a bearing, planning a course.
Measuring distance, time, depth.
(Time: 40 minutes)

3 T 3 UNDERWATER SEARCH AND RECOVERY TECHNIQUES

Situations requiring use of these techniques.
Planning and selection of appropriate techniques.
Search methods: compass search, Jackstay search, grid search, circular search, swim-line search.
Marking and evaluation an object.
Lifting with buoyancy, calculations.
Attaching lifting bags, air supply, the lift.
Safety considerations.
(Time: 60 minutes)

3 T 4 COMPRESSOR OPERATION

Principles of operation of a compressor.
Purity of air, filtration.
Operating procedures, filling cylinder.
Compressor controls.
Use of storage bank.
Records and legal obligations.
(Time: 60 minutes)

3 T 5 ACCIDENT MANAGEMENT

What can go wrong.
Avoiding accidents, importance of planning.
Actions in an emergency.
Weather and water conditions.
Condition of divers, fitness, health, experience.
Missing diver(s).
Boat breakdown.
Diving related problems.
Injuries.
Rescue management.
First aid and aftercare management
(Time: 60 minutes)

3 T 6 ORGANISING A GROUP DIVE

Composition of group.
Selection of dive site, access, transport.
Timetable, planning requirements.
Personnel, dive group composition.
Equipment needs, safety equipment.
Diver briefing.
Diver log, records.
Safety precautions.
(Time: 60 minutes)

3 T 7 PHYSICS / PHYSIOLOGY REVIEW

A review of material from 1T5, 1T7, 1T8, 1T9 together with a general review of future trends and current developments.
The gas laws.
The human life-support system.
Effects of pressure on the body.
Diving disorder, symptoms, treatment.
(Time: 60 minutes)

3 T 8 DIVING EQUIPMENT REVIEW

A review of material from 1T5, 1T7, 1T8 et 1T9 together with a general revue of future trends and current developments.
Cylinders, care, testing.
Regulators, performance, servicing needs.
Protective clothing, suitability for type of diving, care.
Buoyancy systems, .relationship to other equipment
Diving equipment as a “ system ”.
Instrumentation, new developments.
National standards, legal requirements.
(Time: 60 minutes)

KNOWLEDGE ASSESSMENT

Before granting the qualification the instructor should ensure the student has retained and understood the knowledge required to be a safe C.M.A.S. three star diver.

The assessment will usually take the form of a prepared test using “ multi-choice ” questions which allow the coverage of many topics in a short period. Weaknesses which are suggested by the result of this paper can then be investigated by further oral questioning if necessary.

CONTENT OF PRACTICAL LESSONS

3 P 1 SMALL BOAT HANDLING

The student should gain sufficient experience to be capable of handling a small boat, up to 5.5 m length, in normal diving conditions..
 Checking and preparing a boat prior to use by divers.
 Launching, loading, starting, leaving mooring / berth.
 Safe operation under conditions not exceeding Force 4.
 Techniques for use with divers, following divers, picking-up divers.
 Action in an emergency.
 Return to mooring / berth.
 Removal from water (if appropriate).
 (Time: 45 minutes)

3 P 2 UNDERWATER NAVIGATION

Using a compass on land.
 Using a compass on the surface.
 Using a compass underwater.
 Swimming in straight lines, swimming reciprocal courses.
 Taking bearings and planning courses.
 Measuring / estimating distance.
 Show ability to bring back a dive team to the departure point (Time: 60 minutes)

3 P 3 SEARCH AND RECOVERY

Identify area to be searched.
 Select technique to be employed.
 Prepare equipment, brief personnel.
 Carry out search plan, locate object.
 Evaluate object and select lifting equipment.
 Secure lifting equipment and bring object to surface.
 Bring object ashore or to new location.
 (Time: 2 – 3 hours)

3 P 4 COMPRESSOR OPERATION

Pre-operation checks, starting procedure.
 Inspection of cylinders prior to filling.
 Connection of cylinders to compressor panel.
 Charging operations, use of bank.
 Shut-down procedure, care of filters. (Time: 60 minutes)

3 P 5 ASSISTING A DIVE ORGANISER

Understand all the pre-dive planning requirements.
 Consider the allocation of divers and dive-leaders / instructors.
 Consider the timing requirements.
 Ensure that equipment required is available / functioning.
 Record all activity.
 Plan for emergency procedures.
 Adapt plan to site / facilities.
 (Time: 4 hours)

3 P 6 ACTING AS DIVE ORGANISER

3 P 7 As for 3P5, carried out under supervision but following student's plan .
 (Time: 4 hours)

EXPERIENCE DIVES

The CMAS Three Star Diver must have minimum 50 dives at the time of certification of which 20 dives should be on the 30 meter range

The dives logged should demonstrate the diver's broad experience of diving under varying conditions and over a period of time suitable for the accumulation of skills and knowledge. The log should indicate those dives where the diver has been responsible for other divers or for the planning of the diving operation.

SKILLS ASSESSMENT

The main qualities to be assessed by the instructor will be the student's ability to organise and lead other divers, together with a demonstration of competence in the areas covered by the programme. The three star diver must be "fully trained" and should therefore not display areas of weakness in the practical performance of diving.